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The Most Modern Portland Cement Plant in France*

Poliet and Chausson Plant at Gargenville Has Remarkably Fine Power House and Other Interesting Features

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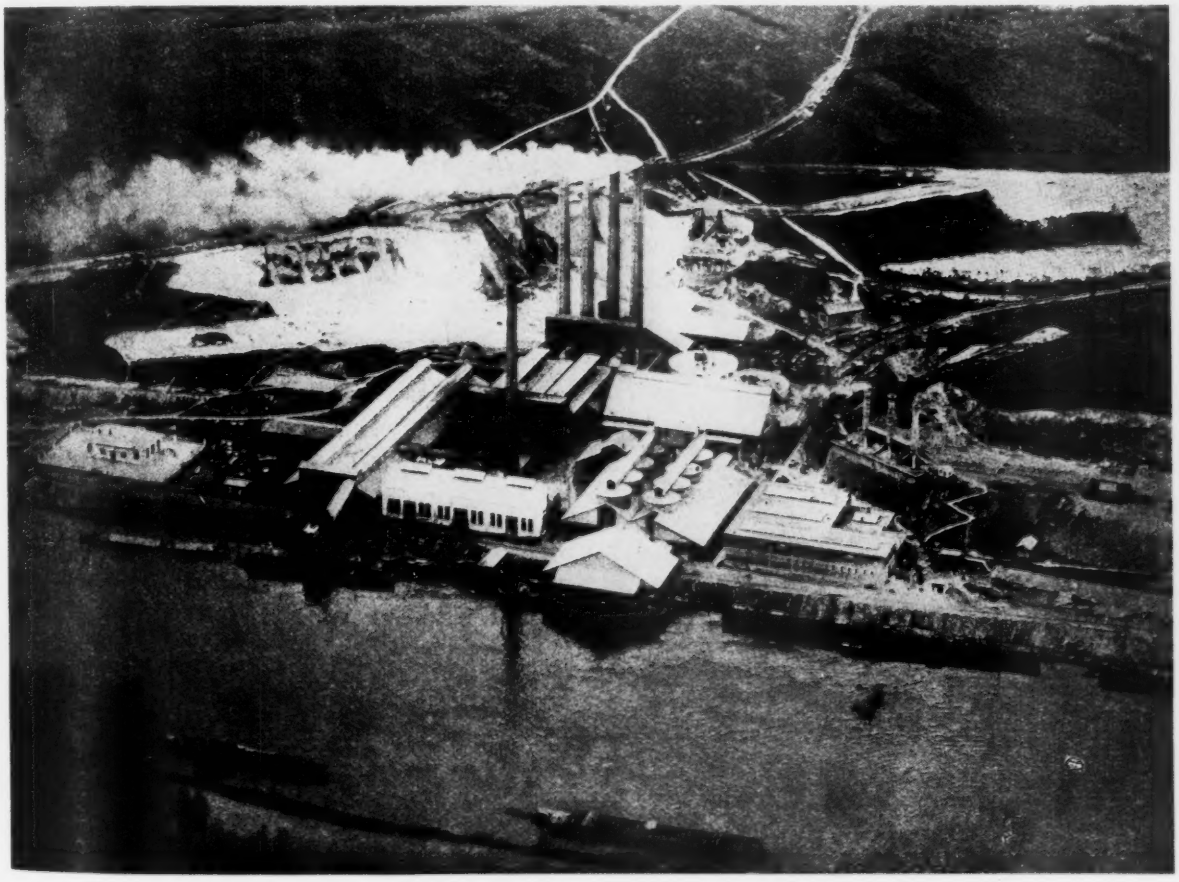
THE portland cement plant which the Poliet and Chausson Works have built at Gargenville, France, is, if not the largest, at least, one may say without exaggeration, one of the best equipped plants of its kind to be found either in France or any other country, because of the most modern and improved machinery with which this factory has been provided.

This plant is designed for an annual production of 200,000 tons (approximately 1,000,000 bbl.) of cement, and we shall give as complete a description of this model plant as is possible, stressing certain particulars of the greatest interest. The planning of this plant has been done particularly with a view to obtaining the most practical and economical process of manufacture; the size of the output has had minor consideration.

Its construction, begun during the World War and carried on since then with

*Mines, Carrieres, Grandes Enterprises, January, 1923.



General view of the new portland cement plant at Gargenville, France, from the south

a surety of aims, a method and a tenacity which have overcome countless difficulties, constitutes a really remarkable feat, and it is only fair to give full credit to its originators whose efforts correspond so aptly to unceasingly increasing needs.

Situated on the right bank of the Seine, in the town of Juziers (Seine-et-Oise), and connected by a standard-gage railway spur of 1800-meter length with the station at Gargenville, on the line from Paris to Mantes via Argenteuil, the plant is built upon an extensive layer of chalk and covers an area of approximately 3 hectares (about 2½ acres), and adjoining the factory site the company owns another 80 hectares (about 65 acres) of chalk and clay quarries. The clay quarries are 4 km. distant from the plant and connected to it by a 60-c. gage Decauville railway track.

Thus the essential conditions of proximity to its beds of raw material and convenient connections by rail and waterways are fulfilled.

Fuel Supply

Fuel is brought in barges of from 300 to 1200 tons capacity, and unloaded by a 3-ton Babcock & Wilcox electric crane, equipped with a grab bucket and with a single 30-hp. electric motor. The radius of the crane is 35 meters, and the working speed is two lifts of the shovel per minute.

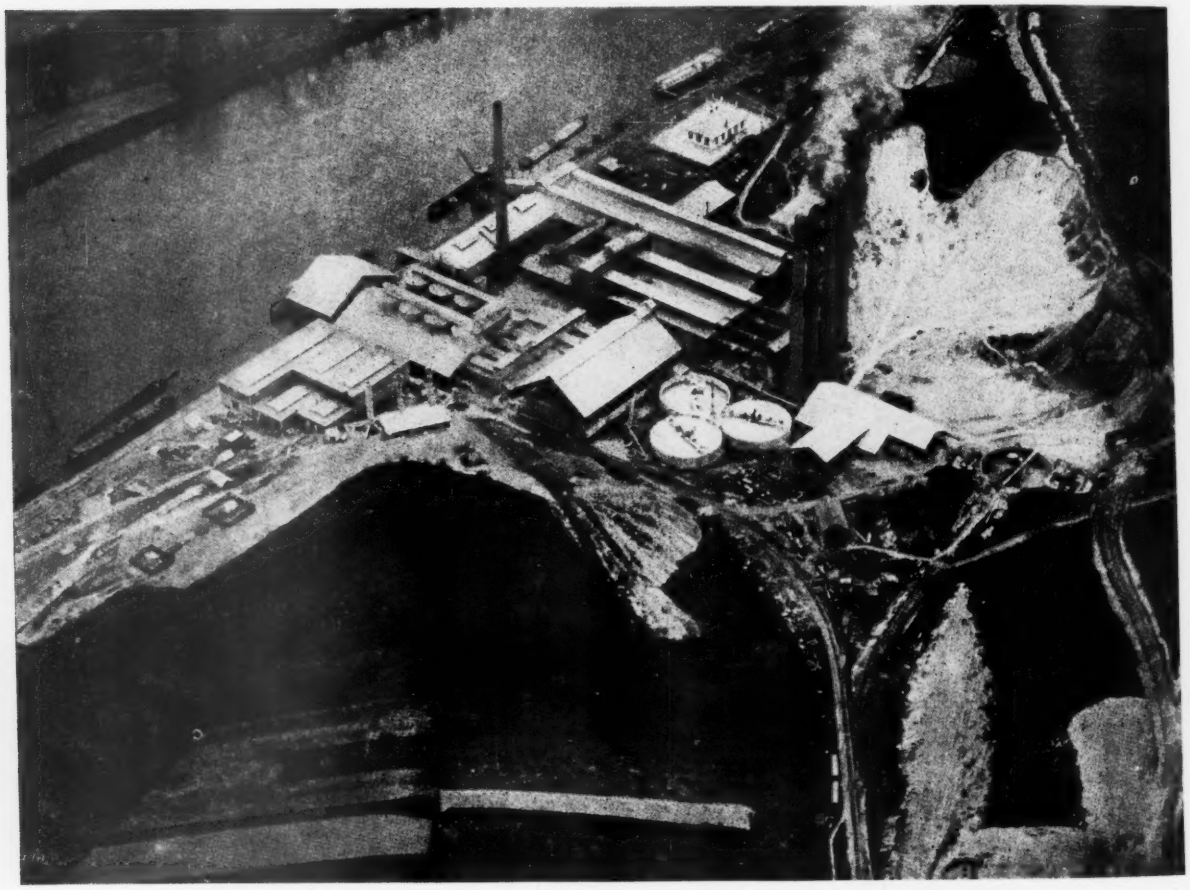
The crane dumps the coal into a reinforced concrete hopper which has a holding capacity of 12 cu. m. (about 15.7 cu. yd.). From the hopper it is lifted by means of a Simplex belt conveyor to the upper floor of a building, located in line with the axis of the crane and a bridge structure through which the belt conveyor runs, the feed end of the conveyor being located below the hopper, which unloads the coal on the belt.

A second belt conveyor runs parallel with the horizontal part of the first one. The second conveyor is loaded from the first by means of a cross belt conveyor at the entrance into the storage building. Each of the conveyors has a self-propelling distributing tripper running on rails, distributing the coal into any of the storage bins, as required. The bins are hoppered at the bottom and unload the coal to conveyors running below them which discharge it into a bucket elevator between the belt conveyors. This elevator lifts the coal above the bins and discharges it to another conveyor placed at right angles to the distributing conveyors and carrying the coal to the coal drier.

Central Power Station

The power needed to run the plant is furnished by a central station consisting of a battery of Babcock multitubular boilers feeding three turbine alternators which revolve at the rate of 3000 r.p.m. and produce a three-phase, 50-cycle, 300-volt current.

At present there are seven boilers installed, two of which are auxiliary units. Each boiler has a heating surface of 250 sq. m. (2691 sq. ft.). The superheat is carried at 350 deg. C. Each of the boilers generates 5000 kg. (11,000 lb.) of steam per hour, and is equipped with automatic stokers provided with a mechanical adjustment and draft, which permit employing any kind of fuel.



General view of the new cement plant taken by aeroplane from the north

The feeding of the coal bins above the stokers is effected by means of an electric monorail, and the removal of clinkers and ashes is accomplished by means of small circulating trucks operating in a gallery underneath the ashpits.

In the engine room are installed, side by side, three turbine alternating-current generators, two of which have a capacity of from 1000 to 1400 kw., and the third of

from 2000 to 28,000 kw., thus providing for a total capacity of from 4000 to 5600 kw. (The illustration shows one of the 1000-kw. turbines and the 2000-kw. unit; the second 1000-kw. unit, not shown in the illustration, is placed on the side of the first unit of the same capacity.)

These electric generating units, built by Sautter-Harle, are of the double-rotating radial type, Ljungstrom system, and their steam consumption is smaller than that of any other system known at the present time.

It is for this reason that, under expected normal conditions of operation, with steam at 12 kg. and 350 deg. C., and with water circulating in the condensers at 15 deg. (Celsius), the consumption of steam per kilowatt-hour furnished at the terminals of the alternating generators, starting included, is but 5.6 kg. for 1000-kw. capacity, and but 5.5 kg. for 200-kw. capacity.

The alternating generators are capable of carrying on a continuous run, and without overheating of the coils to a dangerous point, an overload of 40 per cent. This explains the capacity margins of 1000 to 1400 and 2000 to 2800 kw. before mentioned.

Running on overload is accomplished through the opening by hand of a special valve which feeds live steam into the chambers of the turbines at an intermediary point.

The surface condensers of the Contraflo type, connected with a pump and kinetic reservoir, effecting a vacuum of 98 per cent, were likewise built by Sautter-Harle. The freely expanding tubes, provided with packed joints, can easily be replaced.

The air pump, of the kinetic system, is provided with a steam ejector and a water ejector mounted in series. The second of these, fed by water drawn off from the condenser, condenses the steam of the first ejector, all the calories of which are thus gathered up in the water which feeds the boilers.

Special Concrete Foundations

Because of the poor quality of the subsoil, the entire machinery installation was erected upon one concrete platform in which galleries for the laying of electric cables were provided, the arrangement being executed in such manner that each alternating-current generating unit is resting on four columns of the condenser which in turn rest upon four columns of concrete connected with the before mentioned platform, the arrangement not affecting the steam inlets, which are without expansion joints.

Details of Turbine Generators

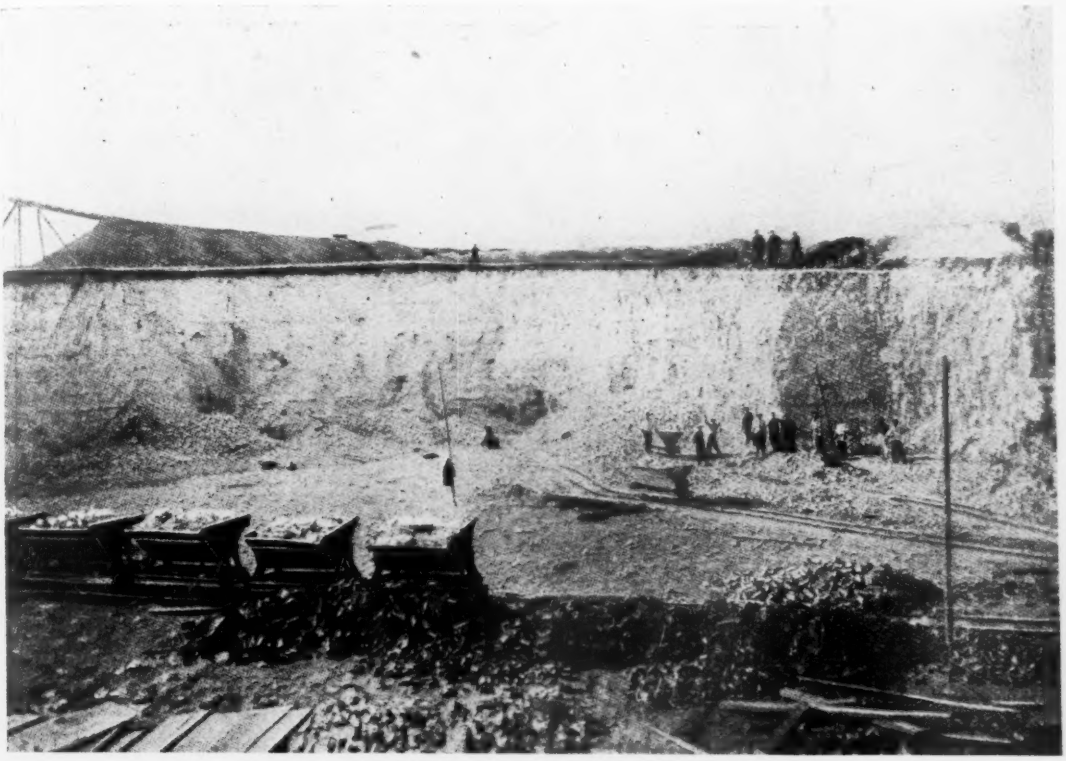
The main frame of each of the turbine alternating generators has the form of an elongated cylinder; it consists of three sections which are bolted together, the middle section contains the turbine and the adjoining sections the alternating-current generators, the shafts of which are mechanically independent and revolve in opposite directions.

An air filter is inserted at the entrance of the piping system, supplying fresh air to the ventilators of the alternating generators.

The circulation pumps of the condensers and the air and condenser-water pumps are driven by electric motors which take their current from the terminals of the alternating generators and are set in motion simultaneously with the alternators. The change from running with free air to running with condensers is brought about automatically during the starting of the turbines by the operation of a valve specially provided for this purpose.

The turbine alternating generators are placed at such a height that the condensers below them are on a level with the ground, and the manipulating levers and apparatus for each unit are 2.5 meters below the ground level, and at a level with the base of the switchboard. This arrangement greatly facilitates the supervision and operation of the machinery.

In order to further facilitate the connecting into parallel of the different units, each turbine has a special electric auxiliary motor acting upon the speed governor



View of the quarry operations of the Gargenville cement plant

and controlled from the switchboard by a contact box with buttons placed over each connecting panel. Thus, as soon as the turbine alternating generator is started, the engineer has nothing further to do, since the electrician adjusts the units to exact synchronous speed and makes connections in accordance with the reading of his electrical measuring instruments.

indicate unbalanced current, three-wire type.

One amperemeter to measure the current of the exciter dynamo for the alternating generator.

One field rheostat for the exciter dynamo.

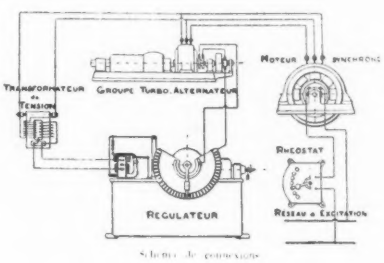
One light indicator with red and blue lamps indicating the working tension.

One inverted contact switch for the auxiliary motor of the alternating generator.

One contact switch to put the alternating generators into synchronism.

The panel for synchronism and connections between the units contains the following instruments:

One electromagnetic voltmeter with a graduation of from 0 to 600 volts.



Scheme of electrical connections

One voltmeter to indicate the tension when connecting the various units.

One synchronoscope with indicator lamps.

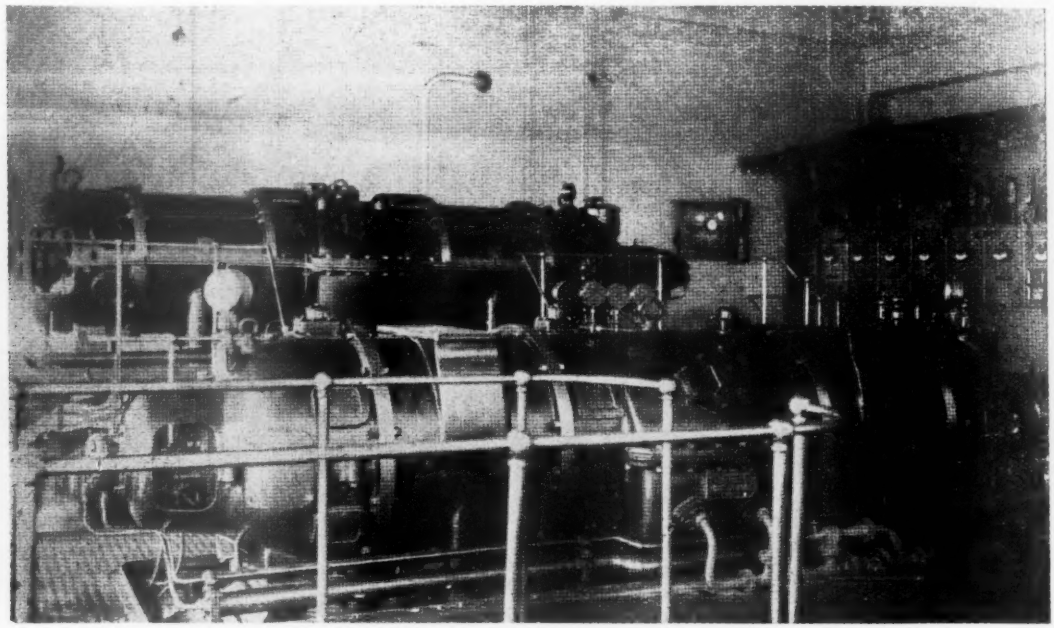
One power consumption indicator, three-phase, to indicate the current consumed by the unit.

One general registering wattmeter.

Transformers corresponding with the tension prevailing in the various instruments.

From this arrangement, it will be seen, all the adjustments for making connections and for the regulation of the current are left in the hands of the electrician, so that any errors in manipulation may be avoided. The electrician, having in hand also the regulation of the run of the turbines, can regulate not only the synchronism of the various connected generating units but also the strength of the working currents, so that they may be properly distributed and balanced. He is guided by the indications of the wattmeters in making all adjustments properly.

The main switchboard, made of blue marble with a base of corrugated iron, extends through the whole length of the generating room, which is 15 meters (about 49 ft.), and impresses the observer by the simplicity and orderliness with which the indicating instruments are arranged.



Two of the double turbine-generator units of the Gargenville cement plant

Installation of the Central Power House

Control of the Units—The alternating generators are connected to the switchboard by means of well-insulated cables, each containing three conductors of 250 square millimeter section (16.125 sq. in.), which are laid in the previously mentioned galleries of the foundation slab. They are provided with bipolar oil switches for each alternating generator, and two transformers connecting with the measuring instruments. The oil switches are placed on a level with the ground and are operated from the main switchboard by means of sprockets and chains.

For the control of the turbine alternating generators the main switchboard contains three panels, one panel for each unit and one panel containing the instruments to connect the units into synchronism.

The panel from each unit contains the following instruments:

One bipolar relay wattmeter, adjustable for a differential of from 1 to 10 sec., and governing on the return current, the tripolar cutout, respective oil switch.

One electromagnetic amperemeter for measuring the current of the alternating generator.

One induction wattmeter, three-phase, to

Regulation of the Tension

Certain electric motors of this plant attain 400 h.p. and consume, when overheated or overloaded, an amount of current which may correspond to 2½ times more than that which is consumed under normal conditions. If, by coincidence, two of these motors work simultaneously under such abnormal conditions, the absorbed current becomes so considerable that the voltage at the central station is lowered so rapidly it may result in a general falling off of speed and synchronism of all the motors in the plant with accompanying inconveniences, such as the function of the interrupting oil switches, melting of the protecting safety

fuses, stoppage of the motors, and therefore the general disturbance of the manufacturing process with a considerable loss of time, before everything can be brought to normal conditions again. Lightning may also cause these deplorable conditions.

To eliminate such occurrences, a Thury governor is installed in the generating station, a newly invented device of a rapidly and automatically acting type, which takes up all the variations in the tension from plus 1 per cent to 2½ per cent times the normal within 1.5 seconds of time, and the correction proceeds during the immediately following space of time to the extent of plus 3 per cent.

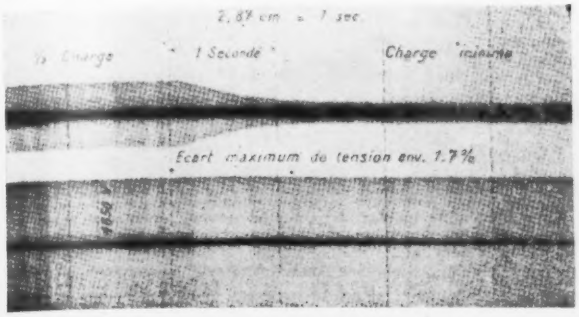


Fig. A—Chart of Thury governor

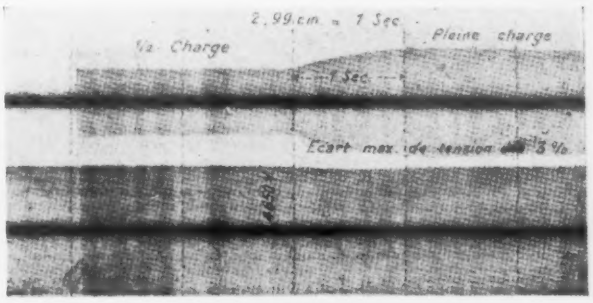


Fig. B—Chart of Thury governor

The regulation is practically absolute and instantaneous and applies itself not only to the variations of the tension of the alternating generating units, but also to the variations of the speed governors of the turbines.

The Thury governor acts on the field rheostat of the three alternating generator units and each rheostat may be independently connected or disconnected, according to the requirements of the operation.

Because of the novelty of this governor and the perfect results obtained from its action, we think it will be interesting to give here a more detailed description of this apparatus and its functions.

The Thury governor, shown in an illustration, is manufactured by the H. Cuenod, Societe Anonyme, de la Chatelaine, near Geneva, Switzerland, and consists of one pump, continuously driven by one motor, which serves to deliver oil under pressure. Through the action of a slide this compressed oil is directed from one or the other side of a float-board, which moves in a cylinder and is supported by the same shaft which supports the regulating device. When the apparatus acts for the regulation of the electric equipment, the angular displacements produced by the oil pressure on the float-board are exactly reproduced for the length which they displace on the dial of the governor.

The distributing oil slide is released at one end of its supporting bar by the electromagnetic balance; at the other end is placed a movable spool, influenced by the action of the field of a powerful electromagnet.

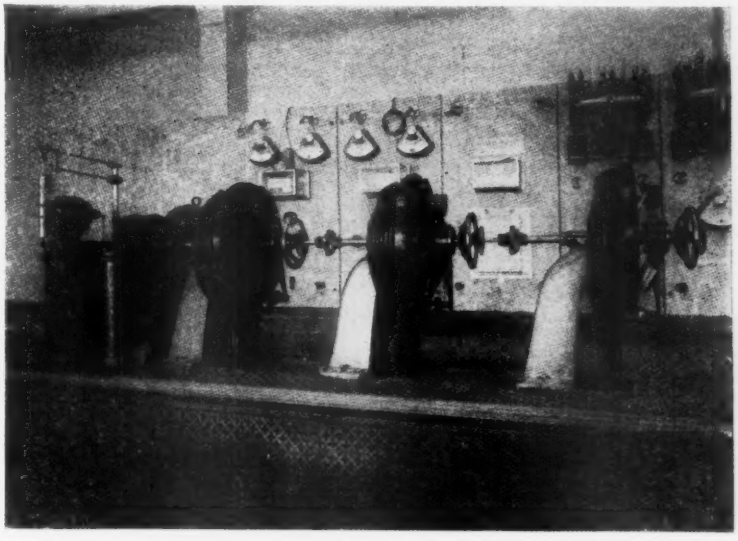
Each strength of the current to be governed corresponds to a certain position of the equilibrium of the electromagnetic balance, which position under normal conditions determines the stop of the oil circulation; or, in case of any deviation from the normal, the flow of the oil is directed to the one or the other side of the float-board and thus produces its deplacement. The reading on the dial of such a deviation from the normal forms the means to limit the action of the governor, and to prevent, notwithstanding the delay caused by the self-induction of the governing inductor, the formation of prolonged periods.

This method of showing deviations through indications on a dial is analogous to the one used in connection with the Thury governor and is generally well known. The device used for this purpose on the Thury governor consists of a dented sector, an adjustable cataract, and a flexible blade. The sector is in line with the axis of the regulating float-board, and in its movement, which is faster than that of the cataract, the flexible blade staying fixed, displaces the point of attachment between the antagonistic forces; this displacement tends to bring back the movable spool in its position of equilibrium and thus to bring the distributing slide to its central position, in which it suspends the distribution of the compressed oil and stops its flow. While the current acting upon the electromagnetic equipment reaches its normal strength, the flexible blade relaxes through the action of the cataract and the arrangement returns to its normal state.

A special device permits variations in the degree of action so as to pass the point of the new stationary position, and to return afterward to normal. Through this arrangement the current from the exciters is forced to modify itself more rapidly and greater speed is gained for the regulation.

On account of an appropriate design and construction, the reaction of the liquid upon the distributing slide is practically nil. The intermediate employment of oil between the heavy and the light moving parts permits a considerable speed in their operation.

Because of the principles on which the apparatus is constructed the time spent for each correction of the current is practically the same—in other words, the action of the governor increases in speed proportionately



Thury governors controlling turbine-generator units

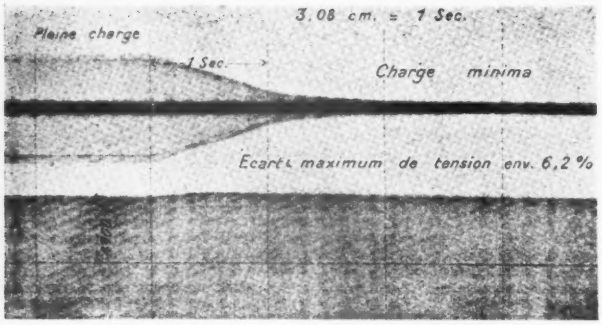


Fig. C—Chart of Thury governor

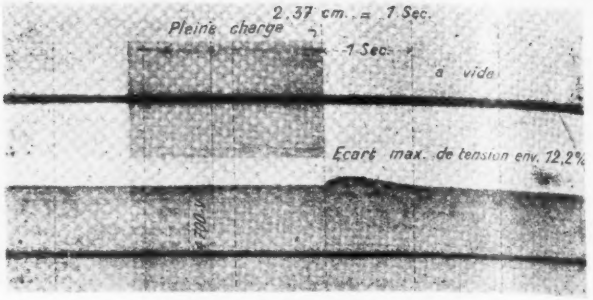


Fig. D—Chart of Thury governor

with the increase of the force which needs correction.

To permit the greatest rapidity of action for the governor, it is necessary to avoid any intermediate parts which tend to absorb energy, and which on account of their inertia would form an obstacle to speedy regulation. It is for this purpose that the dials are placed in a line on the shaft of the governor, by which arrangement all intermediate parts are eliminated.

The advantages of this rapidly acting governor have been demonstrated by diagrams obtained from a series of experiments carried out in the construction shops of the Oerlikon Maschinenfabrik, at Oerlikon, near Zurich, Switzerland, of which we give the following examples:

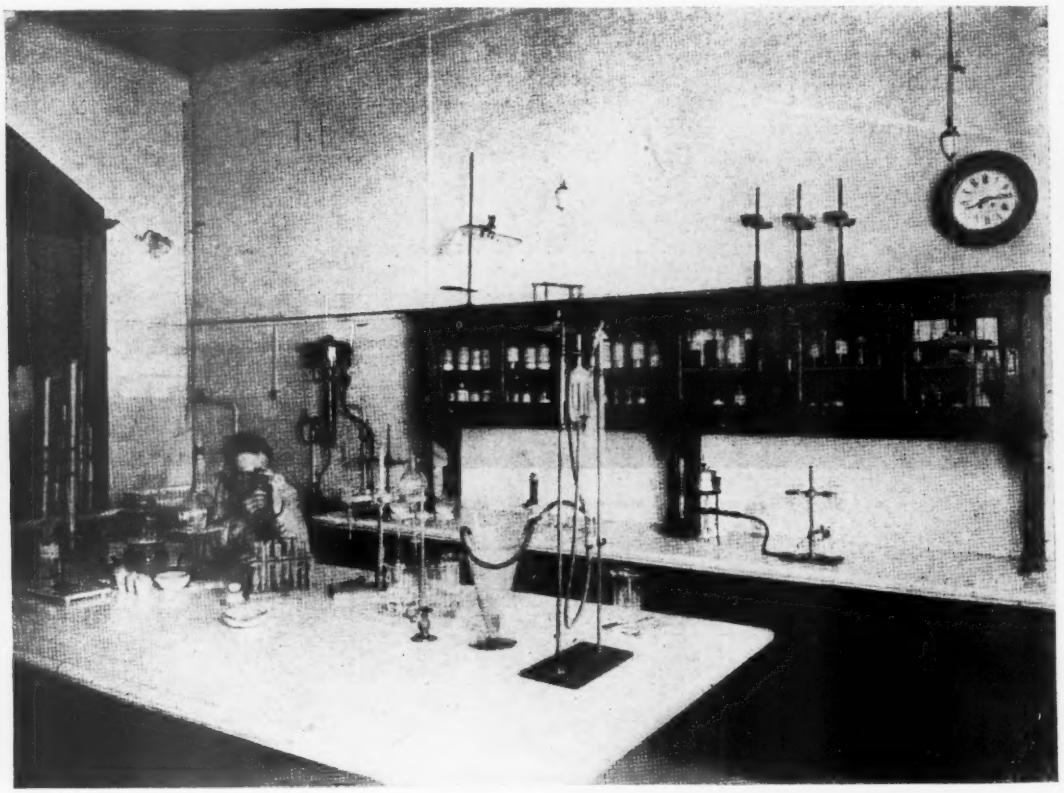
Examples of Governor Action

The machine used for these experiments was a three-phase turbine generator of 1300-kw. capacity, type No. 1078, of 50 cycles, with the exciter dynamo coupled directly to the shaft of the alternating generator. The steam turbine had its own speed governor. The load applied to the generator consisted of one synchronous motor, empty running, on which the excitation was varied. Since cos B = 0, the fall in the tension of the alternator had a maximal value of 25 per cent.

The governor acted through insertions of resistance coils in the exciter circuit of the alternating generator. The intensity of the excitation was from 70 to 150 amp.; the dial had 40 points.

The diagram of this experimental trial showed the following results (Fig. *a*), which were obtained and revealed by means of an oscillograph and are reproduced by Figs. *a*, *b*, *c* and *d*. The cylinder of the oscillograph revolved with a very slow motion, the variation waves were reproduced, vertical and symmetric in relation to its axis. In each of the reproductions of these oscillograms the upper line represents the intensity of the current and the lower line the tension.

Diminution of load was made from half-load to minimum load by rapid operation of the exciter rheostat of the synchronous motor. It will be observed from the diagram Fig. *a*, that the effect on the tension is hardly perceptible, and the time taken by



Laboratory of the new Gargenville cement plant

the governor to bring the tension back to its normal state was less than 1 sec.

Increase of load was made from half load to full load by rapid operation of the exciter rheostat of the synchronous motor. The time taken by the governor to return the tension to its normal state was 1 sec. (Fig. *b*).

Diminution of load from full load to minimum load was made by rapid operation of the exciter rheostat of the synchronous motor. The governor has taken about 2½ sec. for complete correction, but it will be observed that within 1.5 sec. the correction was practically sufficient (Fig. *c*).

Rapid diminution of load from full load to nil was made by operation of the interruption of the flow of oil. Time taken by the governor for correction was only 1 sec. (Fig. *d*).

It must be considered here that the foregoing experiments were made with the first governor that was built, and that the present apparatus has been greatly improved in design and construction.

These oscillograms may be considered as valid approximations for directly governing currents of more than 150 amp. The length of time for correction is reduced for about ½ sec. for an intensity of current of about 10 amp.

The apparatus fails to make indications in laboratory trials on very extreme variations, which fortunately rarely occur during normal service.

The principal advantages of this new governor may be summarized as follows:

1. The speed of its function, ⅓ to 1½ sec. to effect the turn of the dial, depending upon the latter's power of influence.
2. The quickness of operation proportionate to the greatness of variation which is to be corrected, at which the time for correction as always the same.
3. The ability to govern equally well through direct excitation as well as through the excitation of the exciter dynamo.
4. Hydraulic transmission of the energy, and therefore great flexibility and elimination of stoppage.
5. Immersion of all the moving parts in oil, therefore no need of forced or automatic lubrication.
6. Adjustable and precise regulation.

This apparatus is serviceable not only for the governing of tension and intensity of current, but can be applied with equal success on apparatus for loading and discharging the batteries, for regulating the air or gas pressure, for motor speed, for regulating the flow of water to turbines, and any other electric equipment that requires careful regulation.

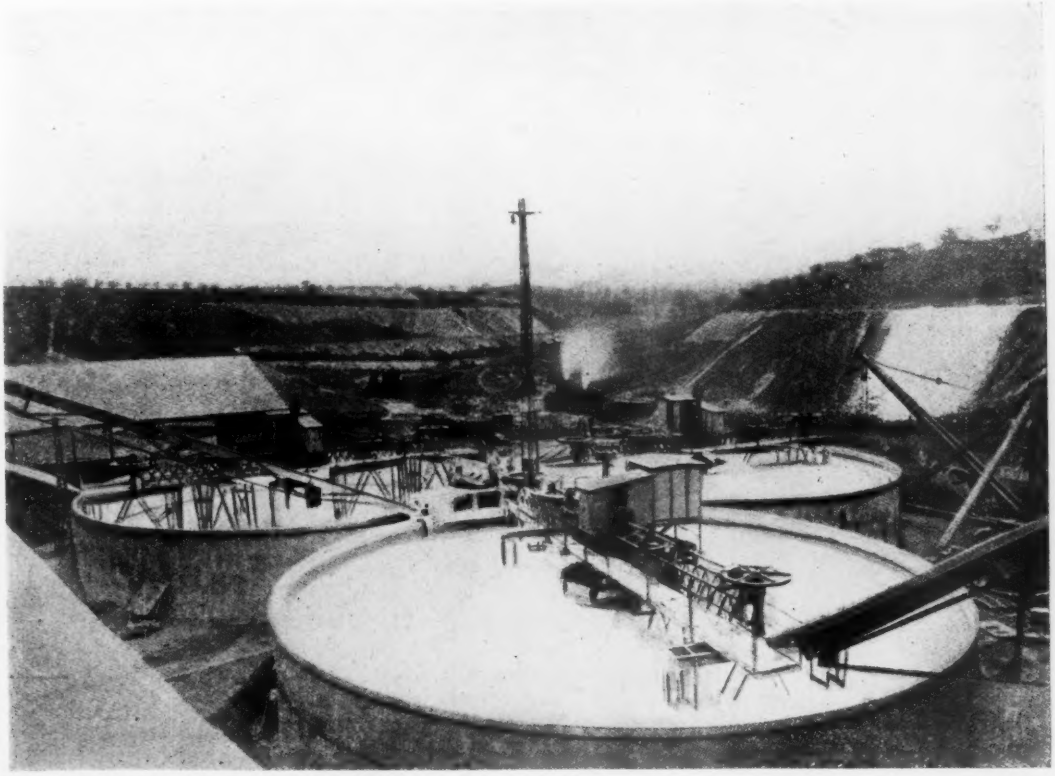
The Distribution of Motor Power

All distribution of current is made by separate conducting lines, feeding individually the large motors or groups of small motors. Each department of the plant is connected with a three-polar cutout apparatus which acts on two phases with amperemeters to indicate the consumption of current on each line.

All the lines consist of well-insulated cables, each with three conductors of a uniform section of 100 sq. mm. per phase, so as to afford ample facilities for repairs. Where power requirements demand it, the line consists of two cables in parallel; where motors are placed in groups, the cable terminals are arranged to permit any of the motors being switched on to any of these terminals. The cable terminals are placed in boxes and are provided with connecting sockets.

Laying the cables underground instead of overhead has been preferred for various reasons:

1. Their installation underground was less expensive on account of the high cost of insulators and supports for overhead conducts for the many cables which would have to be carried.
2. The supports would have formed inconvenient obstacles, since the layout of the plant offers small space for such purpose. The installation has been laid out to occupy as small a space as possible with a view to reducing the cost of manufacture to a minimum and to shorten the distances for the

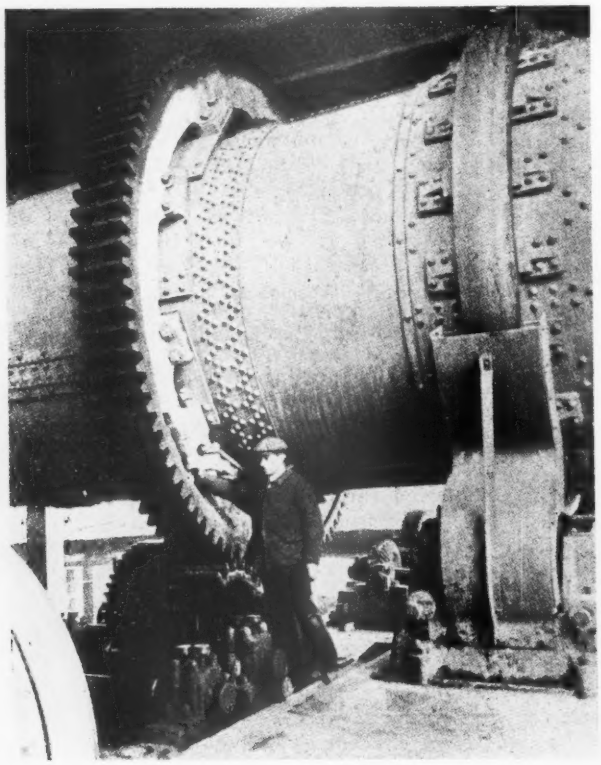


Slurry agitators and mixing tanks of the new Gargenville cement plant

products to be moved from one department to the other.

3. The accident risks with overhead conductors become much greater on account of the many circuits which would have crossed each other at points at various heights when conducted from one department to another.

4. The risks of accidents to persons become also proportionately larger.



Rotary kilns; 200x9 ft.; 10-ft. burning zones

5. Repairs on or changing of lines would become much more difficult during the time of operation of the plant.

As far as the installation of motors is concerned, nothing in particular can be said except that all the large motors are protected by automatic cutout switches acting on two phases, and that one amperemeter for each indicates the consumption of current and the operation of machinery put into action.

The Lighting Plant

The current for lighting the plant is furnished by two three-phase, 50-cycle, 500-volt transformers, reducing the tension to 115 volts. The lighting plant is divided into a number of small circuits, each provided with small switchboards with multiple cutout switches. The main current, being generated by the alternating generators in the central station, is carried by insulated cable lines, each consisting of two conductors with a uniform section of 50 sq. mm. A two-panel switchboard in the central station is connected with the transformers and with amperemeters for each phase on the lighting lines.

All the lighting is effected through the installation of incandescent lamps of from 32 to 1000 cp., their size depending on the space to be lighted.

Summarizing, it will be observed that everything has been so arranged that all risks of accidents are reduced to a minimum; this applies to persons as well as to machinery and material, and to manipulate and control from the central station the operation of the complete plant. After a little practice, it is easy for anyone to observe every day from the indications of the various instruments and the diagrams from the wattmeters in what manner the plant has operated.

The electric installation as well as the steel and iron work used in the construction of the buildings and a number of mechanical devices were manufactured by M. M. Beaudrey et Bergeron, engineers of Paris and specialists for installations of manufacturing plants and steam-electric and hydroelectric machinery.

Machinery for the Manufacture of Cement

Drying Apparatus for Coal.—The coal, which has to undergo a drying process in rotary driers, is first pulverized and reduced to fine powder. It is discharged by two automatic feeders into two driers, consisting of cylinders 12 meters (39½ ft.) long and 1.5 meters (5 ft.) diameter. This cylinder carries in its interior a second cylinder mounted concentrically with the outer cylinder (a double-shell drier).

The drier revolves at the rate of 6 r.p.m. and is driven by an electric motor of 10 hp. running at 1500 r.p.m. through a transmission for the reduction of the speed.

One half of these motors were constructed by La Societe Electro-Mecanique, the balance by the firm of Breguet. (The motors are of the type Boucherot.)

The heat for the driers is generated by a special oven, and the hot gases streaming between the outer and inner shells are returned at the extreme end of the machine after having heated the greater part of the outer cylinder by means of a partition made of fireproof brick, which conducts them with the coal dust they contain into the rotating drier. The gas and coal dust, ventilated by the exhausters serving the rotary driers, are blown into these driers. Thus, thoroughly dried, the coal dust is discharged into two bucket elevators which lift and discharge it into the feeding hoppers of four coal crushers.

Hood and pulverized coal burners

The Coal Crushers

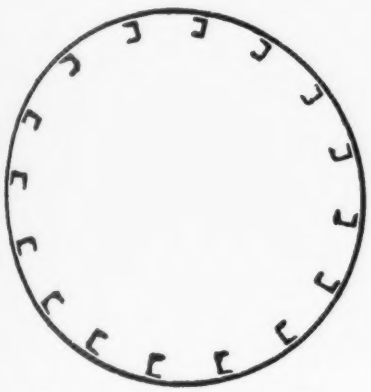
The coal crushers are of the triplex type—in other words, they are subdivided into three compartments, one compartment for coarse, one for medium and one for fine finishing grinding process. The housings of the crushers have a length of 8.23 meters (27 ft.) a diameter of 1.30

meters (4[illegible] ft.), and each is loaded with 4000 kg. (8800 lb.) of steel balls, serving the first coarse grinding department and also with large flint pebbles, to which are added 2000 kg. (4400 lb.) of cylpebs, consisting of small steel cylinders or tubes, which assist in properly finishing the grinding process. The crushers are directly driven by one motor of 135 hp. with an inserted speed reducer (Citroen system) giving the crushers a speed of 30 r.p.m.

Two more bucket elevators lift the pulverized coal to the feed hoppers above the rotating heaters, regulators being employed to regulate the feed of these heaters.

The Manufacture of Cement Slurry

The process of manufacture here employed is known as the wet process. The clay is brought by small trucks from the quarry and directly discharged into a clay diluting apparatus. After proper dilution, it flows by gravity into a tank, constructed of reinforced concrete of 1200 cu. m. (1435 cu. yd.) capacity, and from there it proceeds to the chalk diluting machines where it is blended with the



Cross-section of rotary coolers

chalk. The chalk in general is taken from the quarries by means of small trucks after it has been blasted, for which purpose holes of 1500-mm. diameter (5¾ in.) are drilled by Keystone drills. These holes are loaded with dynamite, and a great number are shot off simultaneously, thus releasing large quantities of chalk. This is then removed by Marion steam shovels of 30-tons capacity and 8 meters (26 ft.) lift without previous breaking up of the chalk.

Slurry-Mixing Apparatus

The slurry-mixing machines consist of five masonry vats, to treat chalk, and one additional vat for clay. Three of these vats are in constant service under normal conditions and are sufficient to supply the capacity of four kilns. The vats are octagonal in form, inscribed in a circle of 9 meters (29.5 ft.) diameter, which form facilitates the breaking up of the diluted material.

Steel paddles or stirrers of strong and appropriate design, supported by a rotating framework on a central pivot, held by pinions and conical wheels and provided with speed-reducing gears, are driven by belts from a 135-hp. motor, and rotate in these vats at 14 r.p.m., stirring and blending the material into a perfect mixture, with an addition of about 40 per cent of water. The water is obtained from a tank of about 100 cu. m. (131 cu. yd.) capacity located in the immediate vicinity of the vats. The slurry-mixing machines function in a manner similar to that of the measuring mixers described hereafter. The material thus diluted and blended is discharged from the vats over sieves provided with meshes of 2½ to 3 mm. (approximately 10-mesh), placed around the periphery of the diluting vats. From these sieves the mixture is conducted into a cistern from which it is transported to the slurry grinding mills by bucket elevators.

Slurry-Grinding Mills

The slurry in the grind mills is ground so fine that it will pass through screens provided with wire cloth containing 4900 meshes per sq. c. (180-mesh) and not more than about 6 per cent of the material tails over these screens. The mills have a length of 8 meters (26¼ ft.) and a diameter of 1.675 meters (5½ ft). They run at a speed of 25 r.p.m. and are driven from 135-hp. motors. The grinding process in the mills is effected by large flint pebbles.

The slurry leaves the screens at the tail end and runs into a cistern from which it is raised by pumps which distribute it into the measuring mixers.

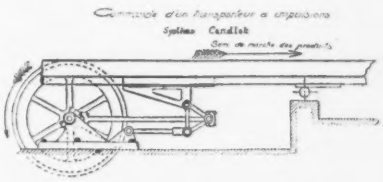
Measuring Mixers

To obtain a constant composition, the slurry undergoes a chemical mixing process which takes place in vats of reinforced concrete. These have a diameter of 20 meters (65½ ft.) and a depth of 4.50 meters (14¾ ft.). In these vats revolves a mixing apparatus of the Sun and Planet type, which consists of an upright shaft, turning on a central pivot and supporting on framework a horizontal shaft which is driven from a 30-hp. motor, both shafts being connected by conical gearing. The upright shaft carries four paddles which revolve. Each consists of a framework of crossed angle irons which almost reach the bottom of the vat. Because of the reaction on the slurry, the transverse mixer turns by itself, and the total of the liquid mass is thereby thoroughly blended.

An illustration shows the towerlike structure to which the electric cables are attached which serve the motors. The liquid slurry is discharged from these measuring vats into subterranean pipe conduits, thence it is taken by a group of pumps each of 15 hp., which deliver it to distributing pans. (Each pump is capable of feeding two rotary kilns.)

Distributing Pans

On the upper part of the rotary kiln building is one large distributing pan. The slurry is carried to the building by four pipes through which it is forced by pumps, one pump for each pipe. Since each kiln is fed by one pan holding 2.0 cu. m. (2.6 cu. yd.) the previously mentioned large distributing pan is provided on each side with a registering device which indicates



Candlot push conveyor, showing mechanism

the quantity of slurry fed into each of the smaller pans, the slurry passing through a screen before entering the smaller pans placed on each side of the larger one. These smaller pans serve as a gage, delivering to each kiln a predetermined quantity of slurry. An overflow is provided for the larger distributing pan, so that any excess quantity of slurry is returned to the measuring mixers.

Making the Clinker

Rotary Kilns.—The heating, or baking operation of the clinker takes place in rotary kilns. These kilns consist of steel cylinders each of 62 meters (200 ft.) length and 2.75 meters (9 ft.) diameter. (At the heating zone the diameter is increased to 3.05 meters [10 ft.].) The cylinders are placed on an inclined axis, the incline being about 4 per cent. The lower part of the kilns contains a partition constructed of fireproof brick 23 c. (9 in.) thick. The temperature at this part of the heater is about 1450 deg. Celsius. At a distance of 15 meters (49 ft.) further back, where the temperature is only about 350 deg. Celsius, the thickness of the firebrick partition is reduced to 11 c. (4¼ in.).

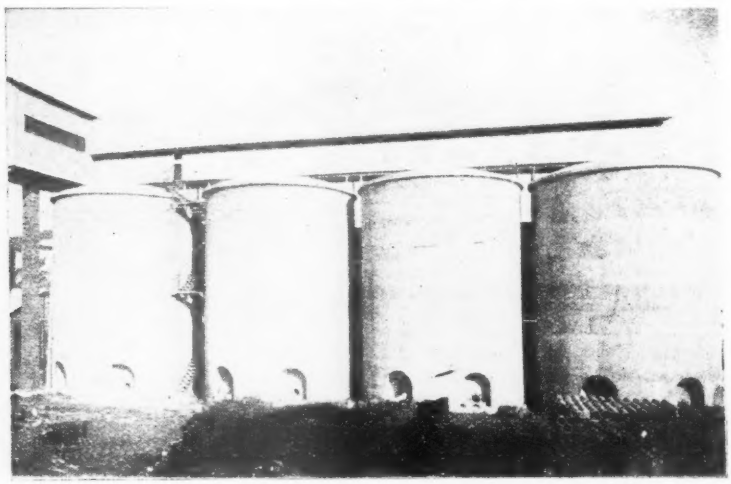
The powdered-coal fuel passes through a sieve with 4900 meshes per sq. c. (180-mesh), the tail over the sieve being only about 8 per cent. The gases escape through flues at the back of the kilns, the flues being connected to chimneys of 60 meters height (196 ft.) of the Monnoyer type with arches, forming small columns.

The kilns are supported on four points of their length through an assembly of steel rolls of one meter diameter (39¼ in.) and 40 c. (15¾ in.) width, and they revolve at a speed of one revolution in 90 sec. They receive their motion separately through a cross shaft placed in the center

between these assembled roll supports. The cross shaft, shown in an illustration, is driven by belting from a 135-hp. motor running at 1450 r.p.m., and placed at the back wall of the building. Each of the heaters produces approximately 160 tons in 24 hr. with a consumption of 25 per cent of coal powder. These machines were constructed by Ernest Newell & Co., Ltd., of Misterton, Gainsborough, England.

Clinker Coolers

After leaving the heater the clinkers drop into a cooling cylinder, which is placed in line with the axis of the kiln. The internal surface of these cylinders carries a number of channel irons (see the illustration) attached in a longitudinal position, which, when the cylinders revolve, lift the clinkers to a certain height and drop them in a regular, cascade-like stream. A flue is arranged in such a way as to carry the cool air from the outside through the entire length of the cooler cylinder. This air is heated through contact with the hot clinkers and is carried back and used over again to help the combustion in the kilns.



Concrete silos for the finished cement

The cooling cylinders have a length of 20.7 meters (71¾ ft.) and a diameter of 2.0 meters (6½ ft.) which is enlarged at certain places to 2.28 meters (7½ ft.). The incline of the cylinders is 6 per cent; they revolve at 1 r.p.m. and are driven from the 135-hp. motor which at the same time drives the corresponding kiln.

The clinker is discharged from the cooling cylinders on two push conveyors, Candlot system, one conveyor serving two coolers (see illustration). These conveyors carry the clinker to two bucket elevators which discharge to a Simplex belt conveyor coupling the clinker to the storage house.

The Clinker Storage House

This building has a capacity of 15,000 tons. It is 45 meters (148 ft.) long, 25 meters (82 ft.) wide and 14 meters (46 ft.) high. Its floor is level with the carrying part of the Simplex belt conveyor, which transverses it in its full length. A reinforced concrete block at each end of the transport holds it in position at a height of 3 and 6 meters (9¾ to 19½ ft.). The clinker is carried in the basement by means of Candlot shaker conveyors to an elevator discharging into the feed hopper of the clinker crushers.

The Clinker Crushers

These six crushers are built on the same principle as the coal crushers and contain three compartments. Their housing are 10 meters (32¾ ft) long with a diameter of 1.8 meter (5¾ ft.). Each is loaded with 6000 kg. (13,200 lb.) of steel balls, also with large flint pebbles and cylpebs cylinders to finish the grinding process. They are driven from a 400-hp. motor, running at 700 r.p.m., and are directly coupled to a Citroen speed reducer, which imparts 25 r.p.m. to the clinker grinders.

These mills produce 7 tons of cement per unit per hour; the ground material passes over a sieve with 4900 meshes per sq. c. (180-mesh), tailing over about 10 per cent of the ground material.

A screw conveyor under the mills collects the ground material discharged by them and carries it to two bucket elevators, of which only one is kept in service. The elevators discharge the ground clinkers by means of a covered screw conveyor into a fixed screen on the upper part of the cement storage bins, or into a covered screen, both of which are in general use throughout the plant.

Two of the clinker mills were manufactured by Ernest Newell & Co., Ltd. and four by the Davidsen Machine Works.

Cement Storage Bins

The eight cement storage binds are arranged in two rows of four bins each, and are entirely of reinforced concrete, each having a capacity of 1000 tons. Unloading from the bins is effected by Candlot transports.

The first group of four bins is intended to serve shipment by railroad, each bin having for this purpose two screw unloading conveyors. Each conveyor discharges into a motor truck.

The second group of four bins is intended for water transport and conveyors unload the cement on the loading platform for barges and boats.

The motor trucks are connected to the conveyors by a rapidly acting coupling and uncoupling device which controls their filling, and is especially designed for this purpose by the firm of Candlot. A double motion, rotative and reciprocating, is imparted to each conveyor; this prevents the formation of funnels in the cement during the unloading process and assures a continuous unloading stream.

A large collecting spiral conveyor receives the cement and discharges it into a short bucket elevator which unloads into another screw conveyor that feeds 12 automatic scales, from which an average of 40 tons of cement per hour can be packed into sacks.

The sacks are loaded from the automatic packers on trucks, which are served by a track extending the full length of the unloading platform. Besides the automatic scales and sack packers, the packing-house contains four automatic barrel packers, which permit export shipments, generally handled by means of barges, whose destination is the port of Havre. Temporary gangways are used for loading the barges from the plant.

The daily shipments average 600 tons via the railroads, and 600 tons via water transport. The sack storeroom is very large; about 1,000,000 sacks can be stored there. The machinery in this department consists of two automatic power-driven sack cleaners, one sack printing and labeling machine, and five sewing and darning machines.

On one side of this storage room are the general warehouse and the repair shop.

In conclusion, particular attention is drawn to the excellent location of the plant, so advantageous not only in view of the abundance of raw material at hand, but also in regard to the shipping facilities afforded. The plant is in the vicinity of one of the most important junction points of the Argenteuil-Triage railroad, from which a number of lines diverge and open a hinterland which offers great resources.

The river Seine offers direct communication with Paris and the port of Rouen, which are great points of consumption. It can therefore be predicted that the plant at Gargenville is destined to have a brilliant future because of its modern installation and its happily selected location.

[Comment on the plant, above described, by American manufacturers would be welcome.—Editor.]

Dixie Cement Co.'s New Crushing Plant Nears Completion

Every Modern Feature Possible Has Been Embodied in the Design of This Unit, Which is the Last Word in Economical Production

TO only say that the new crushing plant—almost ready to be put into service—at the Dixie Portland Cement Co.'s operation, Richard City, Tenn., is "modern in every respect" would not be giving it full credit. It is not only modern, but is designed along individual lines, with an objective not only of economical operation but also of stability and consistent production.

The plant is being built on a site several hundred feet from the old plant and will operate independently of it. The original plant has a No. 18 McCully crusher—said to be the first of this size installed—as a primary unit which is located midway of the raw-grind department of the cement mill and the quarry. This old quarry, as well as the original crushing plant, will be abandoned upon the completion of the new unit. Abandonment of the quarry is necessary because of excessive overburden, gradual depletion, and the occasional encountering of an undesirable stratum.

As such conditions as those mentioned warranted the opening of a new quarry, it was discovered that the location of the new quarry would not permit an economical operation of the old plant and that a new one would have to be built. This was due to the new quarry-floor level being approximately 100 ft. below that of the crusher, which would call for an incline and hoist installation.

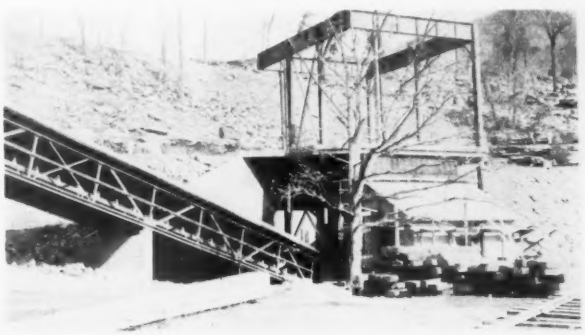
In addition to the objections to the continued operation of the old layout, the crushing plant must have been completely rebuilt, as it had only received minor repairs and is operating on its original foundations and timbers which, after several years' service, had started to decay.

In designing the new plant, W. H. Klein, general superintendent, made every effort toward providing sturdiness in all details, together with plenty of room around each piece of equipment so that repairs could be made with the greatest ease possible.

The initial crusher—a No. 21 McCully "Superior" gyratory—will be mounted on unusually large foundations and will be housed in a separate building of concrete and structural-steel construction. The hopper level of the crusher is provided with a concrete floor and steel railing and, as shown in one of the illustrations, will have a structural-steel overhead frame to accommodate a crane for removing the heavier crusher parts.

The crusher will be set to discharge at 7 in. and the material will be fed to a 36-in. by 150-ft. centers Stearns belt conveyor by a 36-in. by 5-ft. feeder belt equipped with a Cutler-Hammer magnetic pulley.

Within the building at the right are the secondary crusher and screens; at the right are the foundations and housing for the primary crusher



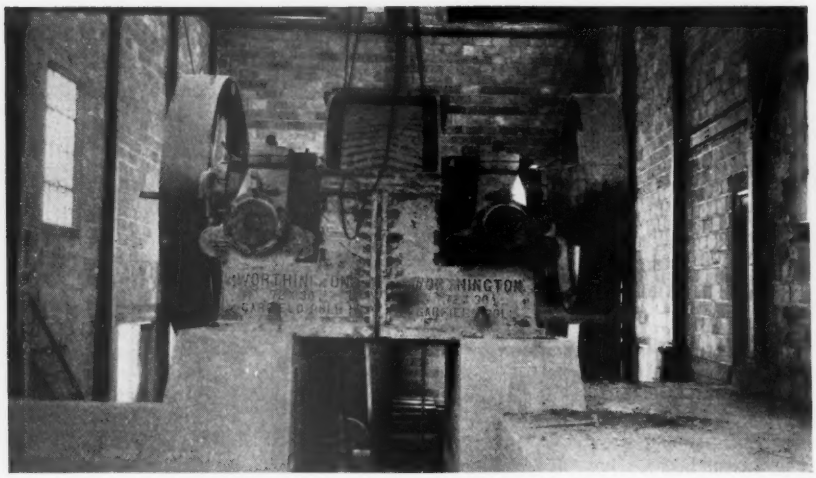
The structural steel framework over the crusher will accommodate a crane for removing the heavier parts for repairs

Laying a standard-gage track to the quarry so that steam shovels can be taken to and from the machine shop

The conveyor leading from the primary crusher is of steel construction throughout, including the idlers, pulleys, crossarms and braces and has a runway its full length to the screens.

Screening equipment and the secondary crusher are housed in one building approximately 40 ft. wide, 80 ft. long, and 50 ft. high. The conveyor from the primary crusher will discharge direct into a 72-in. by 14-ft. Worthington revolving screen of 2½-in. perforations throughout. At the end of this screen and below it is mounted a 72x30-in. Worthington roll crusher which will take care of the rejections. This crusher is set to discharge at 2 in.

The primary purpose of the installation of a screen of this type and construction is to remove the shale from the stone. As the initial crusher will be set to discharge at 7 in., only a small percentage of the material other than shale will be reduced to 2½ in. The shale, or low-lime rock, passing through the screen will be chuted to a 24-in. by 350-ft. centers belt conveyor and the product of the crusher will be removed by a 30-in. belt of the same length which will run parallel to that handling the shale. Both conveyors will discharge into a concrete and

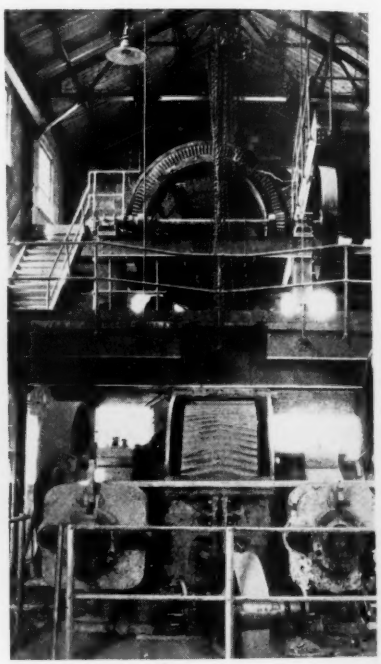


The front side of the roll crusher. Note the roominess

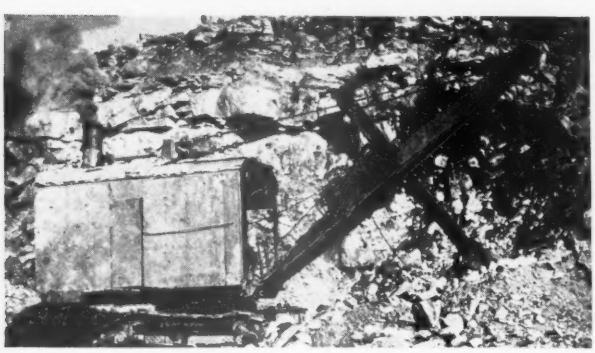
W. H. Klein, general superintendent, who designed the plant and is supervising the installations

The all-steel conveyer (leading from the primary crusher) as it appeared before the belt was put on

This is the old crusher plant, with the first No. 18 McCully crusher ever put in service

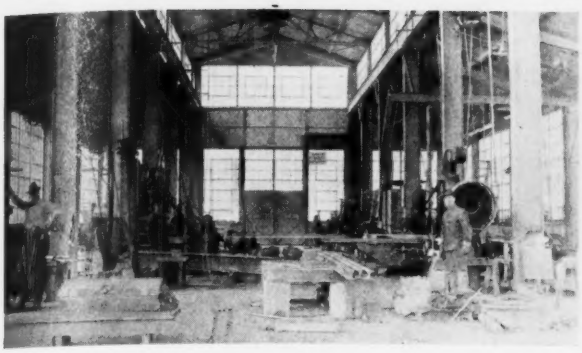


Rejections from this 72-in. screen will chute direct into the secondary crusher

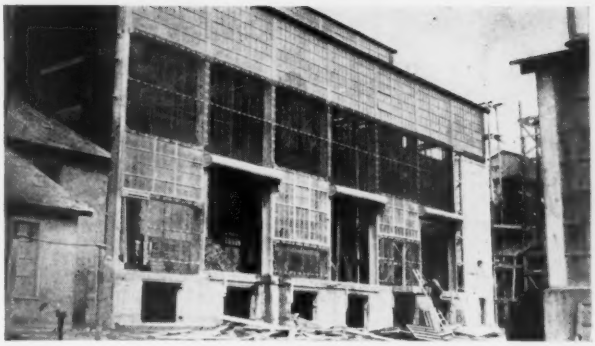


Opening the new quarry. Note the steel-plate housing on this caterpillar-tread shovel

This machine, recently added, is used for general utility purposes. It is helping to build the new plant



This recently completed machine shop is equipped so that any break of any machine on the job can be repaired. Note the glass sides



The new boiler house; constructed of concrete, structural steel, and glass. It houses three 700-hp. stoker equipped longtitudinal drum boilers

structural-steel storage, 80 ft. wide by 240 ft. long, which will be divided into two sections so that the materials may be stored separately.

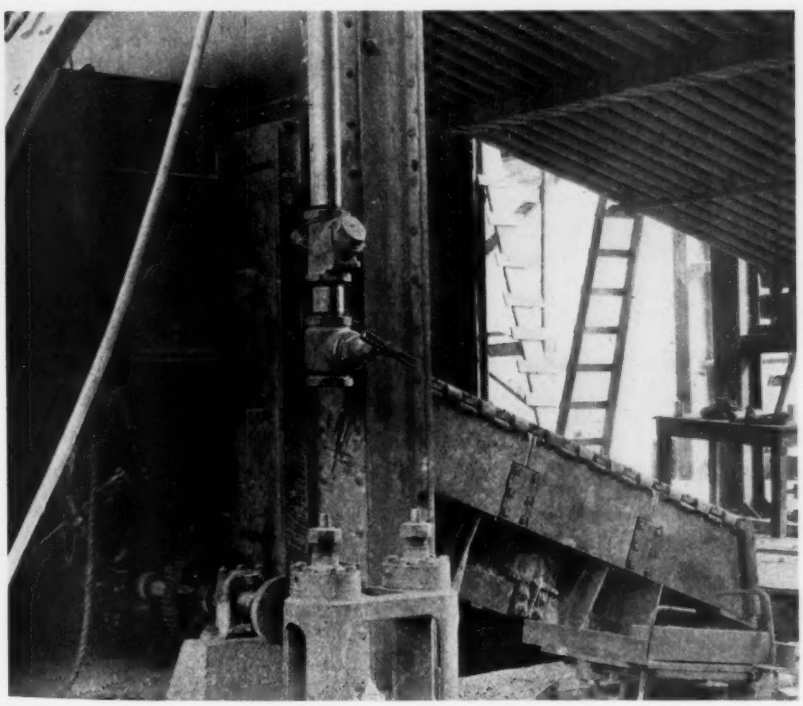
This storage will be equipped with an electrically operated Shepherd crane with a 2½-yd. clamshell bucket. Both materials will be removed from storage by underground conveyors and taken to two No. 106 Smidth kominuters—to be installed later—where they will be given the first treatment of the raw-grinding process.

Opening of the new quarry was made several months ago and its development has been unusually rapid. A temporary incline was constructed leading from it to the old crusher so that its output during development can be used, thereby permitting the removal of shovels and other equipment from the old quarry and installing them in the new one.

The quarry-floor level will be approximately at grade with the crusher dumping-point level so that quarry transportation troubles will be reduced to a minimum. The operation will be equipped with standard gage railway equipment throughout. A track from the main siding will be built to the quarry for taking coal in carload lots direct into the quarry and dumped into a track hopper. This will make possible the coaling of locomotives and steam shovels with a minimum of lost time. A siding from this track leads into a recently completed machine shop which is equipped to make repairs on any machinery on the job, including the steam shovels.

The quarry equipment includes two Model 60 Marion shovels with 2½-yd. dippers and one Model 36 with a 1½-yd. dipper; three Keystone and one Sanderson "Cyclone" well drill and Sullivan and Ingersoll-Rand Jackhamer drills.

The company has recently installed three 700-hp. Babcock & Wilcox longitudinal drum boilers equipped with Westinghouse underfeed stokers. This equipment is replacing ten 400-hp. Heine boilers and is housed in a 50x90-ft. building of concrete, steel and glass construction. All of the new equipment is expected to be installed and in operation some time this month.



A close-up of one of the stokers

Cement Mills Use Annually $1,000,000 of Grease and Oil

MANUFACTURE of portland cement requires the heaviest kind of machinery, some of the giant rotary kilns weighing 670,000 lb.—more than four Pullman cars, says the Portland Cement Association.

Running in a dust-laden atmosphere, the bearing parts are subjected to exceptionally hard wear and tear, and large quantities of grease and oil must be applied frequently to assure smooth and efficient operation.

The grease used last year would supply more than 187,000 high-priced automobiles for a 5000-mile trip, or 3000 cabs for 31 years. The lubricating oil used in that period on cement machinery would operate more than 42,000 taxicabs for a year.

In other words, the cement industry last year used more than 3,800,000 lb. of grease and 3,700,000 gal. of oil, costing well over $1,000,000. Its power plants and finer machinery demand the highest quality lubrication and only the best oils are used.

In addition to the heavy grinding and crushing machinery, constant lubrication is necessary on steam shovels and railroad equipment from the quarry to the mill; sacking machines, sack cleaning and repairing machines, and other equipment. Besides, hundreds of miles of conveyors are also used in these plants.

In spite of the frequent use of grease and oil, cement plant machinery life is probably less than in any other industry.

Quality Standards in Production*

Voluntary Setting Up of Standards Necessary to Progress in Every Basic-Commodity Industry. Producers of Portland Cement Have Led in Establishing Such a Standard

By Frederick W. Kelley
President, Helderberg Cement Co., Albany, N. Y.

QUALITY and quantity standards are essential for the free interchange of commodities in commerce beyond the stage of first-hand transactions in which personal observation and opinion govern. Progress in civilization is measured by commerce, so standards are at the base of civilization as well as of commerce.

Every thinking man must recognize the necessity for standards and the desirability of providing recognized quality standards in almost every line of industry. There are in each industry, however, the practical questions: What should the standards be? How should they be determined? How can their acceptance be best accomplished?

There are at least 20 industries in which nation-wide quality standardization has been undertaken to a greater or less degree. The one with which I am most familiar is the portland cement industry, in which a quality standard for cement accepted throughout the United States was voluntarily established through the co-operation of a large number of public and private engineering and technical organizations concerned with the use of cement.

Each Industry Has Its Special Problems

Each industry has its special conditions and special problems, but I believe the same principles apply to quality standardization in all industries, and that, properly worked out, favorable results in them all will follow. The experience of the portland cement industry may therefore be useful to other industries, and I hope you will bear with me while I bring out a few facts which will show why a nation-wide standard was essential, and will make clear how it was established.

The manufacture of cement is an exact chemical-mechanical process in which natural raw materials are ground and mixed; combined at a white heat to form a new artificial material called clinker, which is again ground to a finished product. The process is exactly controlled technically; uses large quantities of fuel and power; has large plant investment and slow capital turnover. Manufacturers must rely upon a large volume of business to make profits on this heavy commodity, which is of limited shipping radius and which sells at a pound price lower than any other highly manufactured article.

Portland cement when completely manufactured and ready for the consumer is, in its relation to usefulness to the community, a means and not an end. Its useful end is that of an essential ingredient in making concrete.

Cement, unlike many commodities, is not consumed. A concrete structure properly made has a permanent asset value. Full realization of this asset value, continued demand for cement, and the prosperity of the industry, depend upon right quality cement and right quality concrete.

Anybody anywhere may attempt to make concrete and the results reflect for all time the materials and methods used in the first few hours of its history. It is essential to all interests that the user of cement make good concrete.

At the present time, the standard specification for cement is almost universally used in this country. Thus we now have a nation-wide quality standard for portland cement voluntarily accepted by both consumers and producers. It is the highest standard for cement in the world and has had an important effect in promoting, extending, and improving the use of concrete in this country.

Many Advantages to All Alike

The working out of this situation and the establishment of a single standard quality specification for cement has had, and must continue to have, many advantages for consumers, producers, and the community as a whole.

The engineer and designer can rely upon getting anywhere the standard quality cement contemplated by the plans.

Concrete can be designed of definite strength and quality.

Simple rules have been made by which even the inexperienced can with care get good concrete.

Greater efficiency in production and lower cost has been made possible through continuous operation on a standard product.

A standard product can always be kept in stock ready for use.

A standard product is more readily accepted in export trade.

Wider production of cement has been made possible by eliminating unnecessary limitations on raw materials. In 1922 cement was produced in 118 plants in 27 states, compared with 65 plants in 19 states in 1902.

Nearness of production to markets has followed wider production. When it is known that the freight charges on a barrel of cement for an average 100-mile haul are about 30 per cent of the average mill price per barrel for the last three years reported by the U. S. Geological Survey, the importance of this will be appreciated.

Each standard established makes easier the establishment of other standards. The establishment of the cement specification makes easier the establishment of a specification for concrete. In the concrete specifications now in process of formation, the cement specification and specifications for 12 other materials or methods entering into the making of concrete are included.

Better and cheaper concrete structures are the net result.

*Abstract of an address at the annual meeting of the Chamber of Commerce of the United States, May 8, 1923.

Western Lime and Cement Co. Installs Bonus System

ON April 29 the Western Lime and Cement Co., Milwaukee, held a meeting at Fond du Lac, Wis., which was attended by the officials and all the superintendents and clerks. The meeting was in the form of a convention and 25 men were seated at the banquet table.

The object of the get-together was to establish a bonus system which would affect every man working for the company who is a consistent and loyal employe. The system finally agreed upon and which was adopted and put into effect immediately, requires that to be eligible, each man must work a certain number of days each month and that his average must be up to a certain standard at the end of the season, or by November 1 of each year. This will mean a bonus of from $50 to $60 per man per year.

Officials were pleased with the enthusiasm shown and interest expressed by the men and it was agreed at the meeting that one be held every month for the general discussion of any subjects that have to do with the welfare and betterment of the organization. The meeting was presided over by General Manager George W. Nast.

A Study of Lime Kilns

III—Kilns and the Principles of Combustion

By Arthur E. Truesdell
Consulting Engineer, Pittsfield, Mass.

TWO previous articles have covered an introduction to the subject and a discussion of limestone and thermo-chemistry. We will now preface the more intimate discussion of lime burning with a brief consideration of kilns in general.

Kiln Elements

The name kiln is generally applied to such heating devices as handle non-metallic materials at moderate maximum temperatures, the object being, of course, to change the physical or chemical properties of the raw material by the application of heat. Space to do this must be provided for the raw material and the heating agent in a non-conducting and fireproof structure so designed as to direct the heat into the raw material. Should the heating agent be the combustion of fuel, means must also be had for carrying away the waste gases of combustion. As a rule, then, we find in kilns

(a) A furnace where heat is released by combustion of fuel.
(b) A heating chamber for the raw material.
(c) A stack or fan for removing the waste gases.

Each of these should be designed to do its work with greatest efficiency in co-operation with the others in order to have a kiln economical and well balanced.

Principles of Combustion

We can secure heat most easily through the chemical union of heated fuel and oxygen (O). This reaction throws out energy in the form of heat and is known as combustion. Common fuels are composed mostly of compounds of carbon (C) and hydrogen (H), both of which release heat on combining with oxygen. It is self-evident that to be efficient, the combustion should be carried on without waste of fuel or oxygen, which means that these materials before reaching the temperature of ignition must be intimately mixed in the correct proportion to satisfy the equation of the reaction.

Practically, we use air as our source of oxygen. Since air contains 80 per cent of nitrogen (N), an inert gas, our oxygen from this source is highly diluted, which makes an intimate mixture of oxygen and fuel hard to get many times. Air must be continuously supplied to maintain the combustion and so the heated products of combustion which are gases must be moved away to a location which is naturally cooler. Should any fuel or air remain in these gases, they also become cooled and do not combine. The draft must be continuously maintained, so we see a reason for the pre-mixing of fuel and air, and the necessity for combustion space, sometimes provided with baffles for the recirculation of the burning gases, so that time may be had for complete combustion of the fuel before the gases pass to cooler regions.

Burning Coal on a Grate

Without going into details, we will illustrate some of the features of the burning of bituminous coal on a grate as ordinarily practiced. Such a coal may contain on analysis

	Per cent
Carbon (C)	73.60
Hydrogen (H)	5.30
Nitrogen (N)	1.70
Sulphur (S)	.75
Oxygen (O)	10.00
Water (H_2O)	.60
Ash (minerals)	8.05
	100.00

One kilogram of this fuel requires theoretically for combustion 8.2 cubic meters of air, containing approximately 1.6 cubic meters of oxygen and 6.6 cubic meters of nitrogen when the outside temperature is 20 deg. Cent.

COMBUSTION OF BITUMINOUS COAL

Products of combustion	Air: 25 pct. deficient cu. ft.	pct.	—sufficient— cu. ft.	pct.	100 pct. excess cu. ft.	pct.
Carbon monoxide CO	24.9	11.9	.....	.....	.....	.....
Carbon dioxide CO_2	14.1	6.7	45.7	17.0	45.7	8.7
Moisture H_2O	19.6	9.4	20.1	7.4	20.1	3.8
Sulphur dioxide SO_2	.2	.1	2.6	.1	2.6	.....
Nitrogen N_2	150.2	71.9	204.6	75.5	404.4	77.3
Oxygen O_2	.....	.....	.....	.....	52.4	10.2
Total	209.0	100.0	273.0	100.0	525.2	100.0
Available heat developed, calories	4219		7083		7083	
Temp. of products combus. deg. Cen.	1680		1920		1210	
Per cent loss	12.5		.....		37.0	

The accompanying table brings out clearly the evils of allowing deficient or excess air in the furnace. Deficient air causes shortage in the available heat released and low temperature of the products of combustion. Excess air causes low temperature in the products. Note that nitrogen is introduced with the air and passes out of the furnace chemically inactive and in larger amount than any other gas. It enters at a temperature of 20 deg. Cent. and leaves very much hotter, thus carrying with it a large amount of heat. Excess air not only introduces excess oxygen to carry away heat, but a much larger amount of nitrogen to do the same, thus multiplying the loss. For efficiency, then, we must carefully regulate the admission of air to the furnace, although practically we cannot cut down the air admitted to the theoretical amount necessary, for we cannot secure a perfect mixture of fuel and oxygen in a furnace where solid fuel is burned on a grate. Another point to be noted is that efficient combustion is accompanied by high temperature of the products of combustion.

Adapting Fuels for Efficient Combustion

Gases diffuse readily and such fuels before burning can easily be mixed with air in correct proportions.

Liquid and solid fuels must be brought as nearly as possible into a gaseous condition to secure the intimate mixture of the molecules of fuel and oxygen. Liquids are generally atomized and then volatilized in the combustion chamber into which air is carefully introduced. A slight excess of air is generally present in the products of combustion. Solid fuels can be pulverized and blown into the furnace with the correct amount of air, although sometimes secondary (or more) air is admitted into the combustion chamber.

These methods require more or less preparation of the fuel and combustion space properly designed for such fuel. Where the products of combustion do not impinge directly on comparatively cool surfaces (as they do in steam boilers generally) it may

be an advantage to employ primary and secondary admission of air in order to secure radiated heat on the receiving surfaces from a long flame. The velocities of gases at the nozzle and through the combustion chamber are important, as is also the possible recirculation of the gases to secure intimate mixture. Because little or no excess air is used, these prepared fuels and furnace refinements give much better results than when solid fuel is burned on a grate.

In modern kilns the furnace is generally placed outside of the heating chamber and can be thus placed to give maximum effect. This is determined by the size and shape of the chamber. Two or more furnaces are often attached to a single heating chamber.

Heating by Radiation

The heat released by combustion raises the temperature of the burning fuel and the gaseous products of combustion. Any solid particles become incandescent and emit heat by radiation. In carbonaceous fuels this appears in a luminous flame and if solid fuel is used in the burning coals also. Stefan's law states that every hot body radiates energy in proportion to the fourth power of its absolute temperature; so that the transfer of heat is proportional to the difference between the fourth powers of the absolute temperatures of the hot body and the receiving body. Heating by radiation occurs only to an object directly exposed to the hot body and the amount of it available from flame depends mainly upon the kind of fuel, how it is burned and how much of the raw material is exposed to it. Brickwork and raw materials after heating radiate heat also and their influence in some cases is material to the quick heating of large quantities. It is interesting to note that at 500 deg. Cent. calcium oxide radiates four times as much heat as magnesium oxide. At higher temperatures the difference would probably be larger.

Heating by Conduction

The greater heating comes from the contact of the hot gases of the products of combustion with the raw material or its containers. Physicists have shown that the conductivity of the transfer of heat from a fluid to a solid varies approximately as the square root of the velocity of the fluid. This would indicate an advantage in the use of strong drafts in kilns to improve heating, provided that such a draft did not interfere with other necessary conditions. Very little is known about the actual units of transfer of heat by conduction between different fluids and solids at high temperatures. Increase of the surface area by previous crushing or grinding of the solid being heated would hasten the heating, if it did not at the same time interfere with the free flow of the products of combustion about the particles.

Practically, our experience tells us to place the substance to be heated near to the source of heat, so as to secure as much heating by radiation as we can; and by exposing as large a surface of the raw material as possible, and as long as possible to the hot gases rob them of their heat before it is carried away by draft or radiation from the kiln.

Heating chambers vary widely in size and shape. These are determined by the amount of raw material to be heated at a time, its nature, method of handling and temperature used. We have many illustrations of these features in the familiar types of terra-cotta kiln, lumber kiln, cement kiln, lime kiln, etc.

Draft

The stack or fan for carrying away the used products of combustion is generally attached to the heating chamber at a point opposite to the furnace, so that the hot products of combustion will be drawn over and through the raw material to be heated. Their size is determined by the amount of the gases to be handled per minute.

Heating Efficiency

Since the fuel cost in most cases is by far the largest single item in the cost of kiln operation, a high heat efficiency is the most valued characteristic of a kiln. This efficiency is expressed as a percentage and is the ratio of the amount of heat necessary to do the work to that actually supplied. In this way all kilns may be compared directly as such, independent of the fuel used, style of kiln, raw material, etc. Richards* gives the efficiencies of various types of melting furnaces as follows:

	Pct.
Crucible steel melting—wind furnace	2- 3
Reverberatory furnaces	10-15
Open hearth—regenerative	20-30
Shaft—fuel in contact	30-50
Boilers and hot blast stoves	50-75
Large electrical furnaces	60-85
To these may be added	
Rotary kiln—without heat conservation	20-30
Shaft kiln—outside fire boxes	30-45

In comparing kilns or stating fuel economies, lime manufacturers often use the term "pounds of lime per pound of coal." This is an easily understood index; but is meaningless in many cases as denoting kiln efficiency, because the chemical composition of the stone and the heating value of the fuel are not given. Sometimes producer gas is used, in which case "pounds of lime per pound of coal" covers both producer and kiln losses, which is not fair to the kiln as such. In roughly comparing processes, however, this is a simple and useful index in cases using the same raw material. Some authorities use "pounds of carbon per ton of lime" which is open to the same criticism.

Since any substance leaving a kiln at a higher temperature than when entering carries away heat, it is economical to use kilns where the heat of the discharging products is carried back into the kiln by the air for combustion. It is also nearly imperative to use continuous rather than intermittent kilns, thus saving the heat necessary to heat up the kiln structure after each cooling off.

(To be continued)

*Richards, Joseph W.: "Metallurgical Calculations," page 117.

Recent I. C. C. Decisions

One Carload of Sand—An award of reparation amounting to $114.20 has been advised by Examiner John B. Keefe in a report on No. 13261, United Iron Works, Inc., vs. Director-General, et al., on account of an unreasonable rate of 20 cents per 100 lb. on sand, one carload, from Kansas City to Okmulgee, Okla., shipped April 10, 1918. He said the reasonable rate would have been one of 10 cents for a haul of 344 miles. The Director-General offered to settle the claim on the basis of reparation for that part of the haul over lines he admitted were under federal control. He denied the Missouri, Oklahoma & Gulf, then in the hands of a receiver, and since reorganized as the Kansas, Oklahoma & Gulf, was under federal operation. The complainant refused to settle on that basis.

At the hearing on the merits, the Director-General renewed his claim the road was not under federal operation and pointed out that the receiver for that road had required the filing of claims against the road by a day certain as a condition of cognizance, alleged the complainant had not complied with that notice and that having slept on its rights could not recover the full amount of the reparation sought from him. The examiner said no proof of the alleged requirement of the court, nor of the alleged noncompliance had been offered. But he said the existence or non-existence of the facts alleged was not of controlling importance in so far as the entry of a reparation order was concerned, citing Roverside Mills vs. Augusta & Savannah Steamship Co. et al.

Death of Henry Woodland

HENRY WOODLAND, secretary and treasurer of the Allis-Chalmers Mfg. Co., died suddenly at his home in Milwaukee on Monday, May 14.

Mr. Woodland was born in Utica, N. Y. At an early age he became connected with the New York Air Brake Co. of Chicago. Later he was treasurer of the Gates Iron Works of Chicago, which manufactured the Gates gyratory crusher, the first crusher of that type ever made. When, in 1901, this company was taken over in the consolidation which formed the Allis-Chalmers Co. he became assistant treasurer of the new organization and afterward its treasurer. In 1916 he was elected secretary and treasurer of the company.

At the time of his death Mr. Woodland was also vice-president and a director of the Hanna Engineering Co. of Chicago.

He was a man of striking personality, keen judgment and extraordinary business sagacity, and his genial nature, quick sympathy and warm friendliness endeared him to his many friends.

Modern Southern Sand and Gravel Plant Has Large Storage

Knoxville Sangravl Material Co.'s Plant at Knoxville, Tenn., Has 795 Feet of Conveyors which Afford a Ground Storage of 50,000 Tons

LOCATED at the outskirts of the city of Knoxville, Tenn., on the banks of the Tennessee river, the screening, washing and storage plant of the Knoxville Sangravl Material Co. is operating approximately 80 per cent automatically in the production of washed and graded sand and gravel. Designed and built by the Stephens-Adamson Co., Aurora, Ill., this plant is the largest and best equipped conveyor-type plant in the South or Southeast, its belts handling 600 yd. of material daily and depositing it in a 50,000-ton capacity storage.

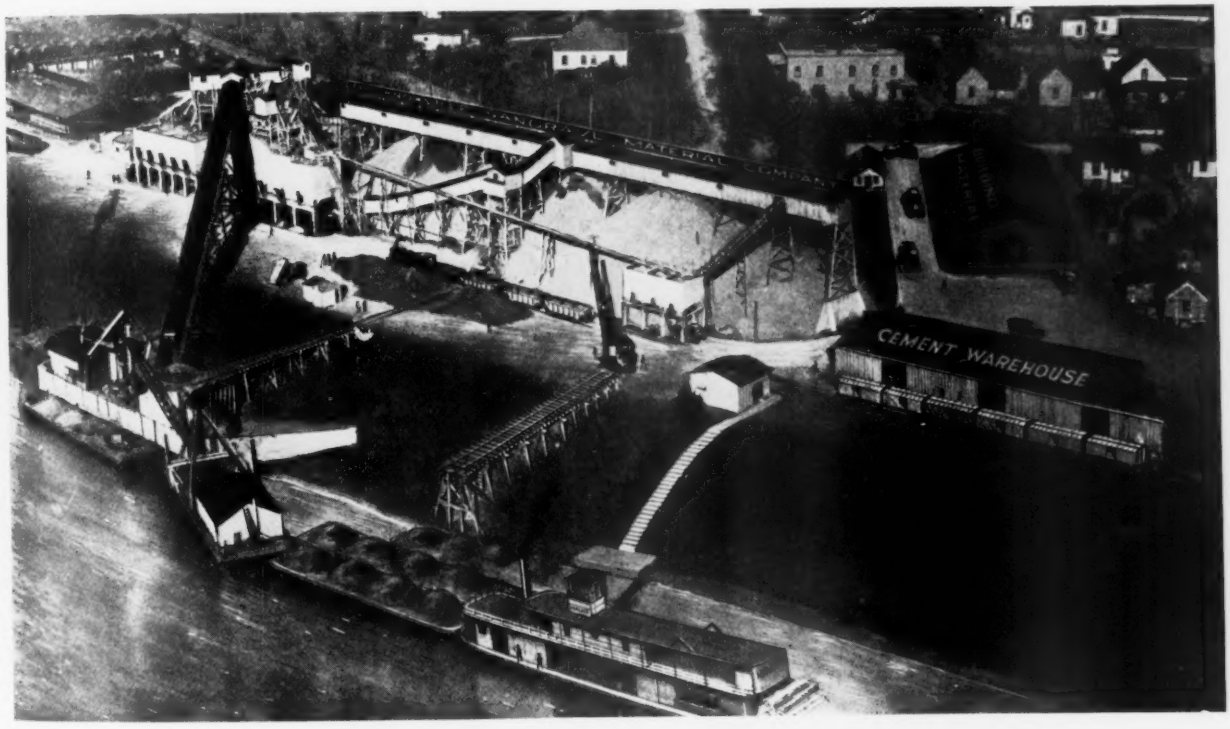
At present the dredge is operating five miles upstream and is served by a fleet of wooden barges of 50 to 150 yd. capacity each, handled by the company's steamboat "Adeline." The "Adeline" tows from three to six barges each trip.

These barges are unloaded by a derrick boat and a stationary shore derrick, both equipped with 2-yd. clamshell buckets, which empty into a 50-yd. concrete hopper, 12 ft. square, fitted with a crossbar grizzly of 6 in. spacing. Oversize is removed by hand. The sand and gravel is fed to the main conveyor belt from the hopper by a 24-in. x 16-ft. steel apron feeder, set to deliver 60 yd. per hour. The main conveyor is 24 in. wide, 234 ft. between centers, raising 123 ft. and is provided with a runway and housing its full length.

The material is received from the conveyor by an 84-in. conical screen of 2-in. perforations with an outer jacket of 1½-in. perforations, and the rejections are chuted to two No. 5 Champion jaw crushers. The crusher discharges into a 16-in. chain-bucket elevator leading directly to the primary screen. Material passing through the first screen is chuted to a second 84-in. conical screen of ¾-in. perforations, having an outer jacket of ¼-in. openings. In this way, with the two screens, three grades of gravel are produced: 1½ to 2 in., ¾ to 1½ and ¼ to ¾ in.

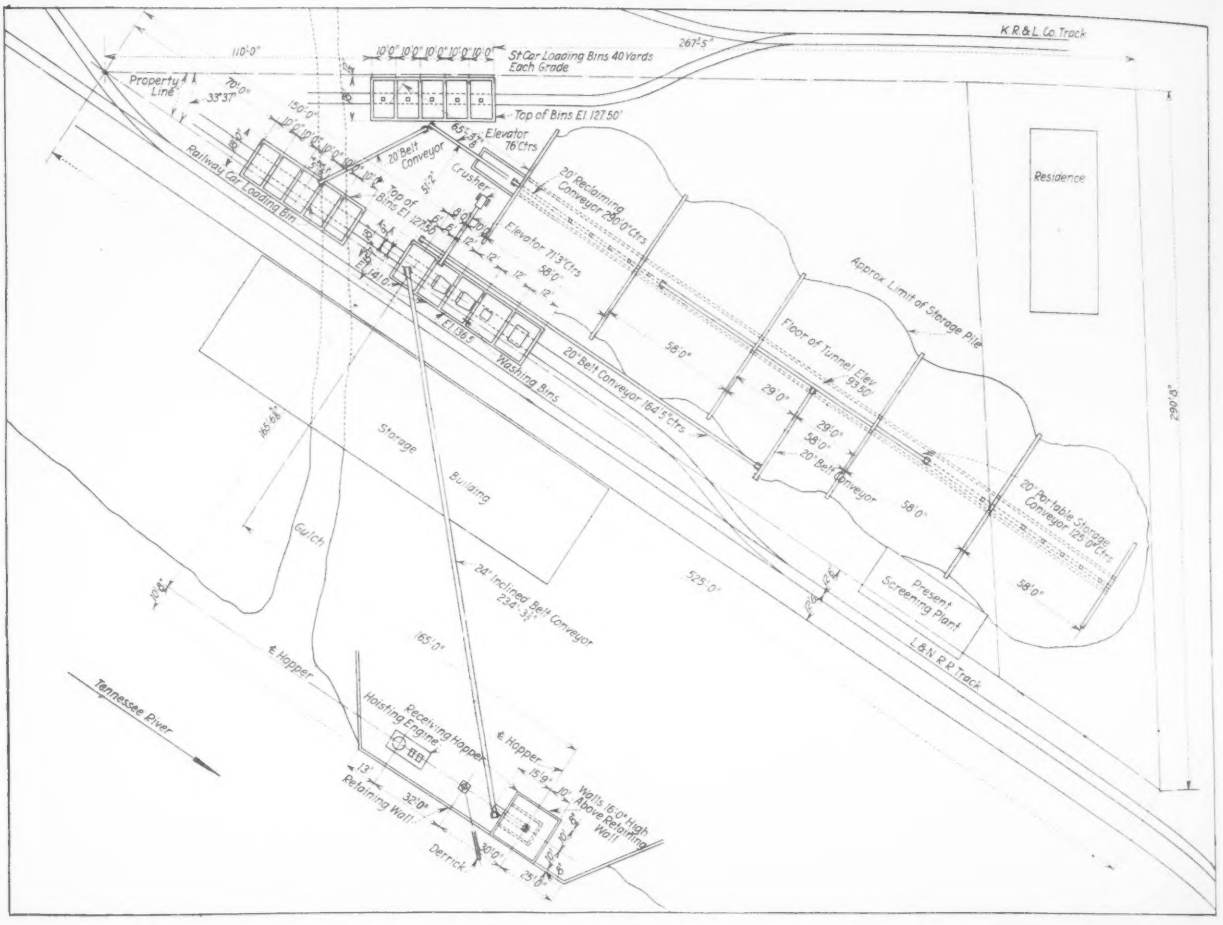
The sand passing through the outer jacket of the second screen is flumed to a flat surface screen of ⅛-in. openings having tapered sides so that a coarse sand for concrete is obtained and all material passing through the screen is sluiced to two box settling-tanks. The first separates the brick, or masonry, sand and the second catches the very fine material for traction purposes and for asphalt use.

The coarse sand passing over the ⅛-in.

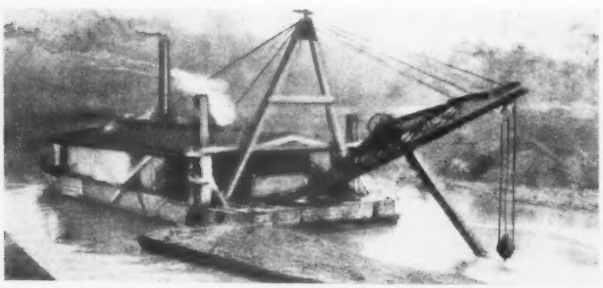


An aeroplane picture showing the entire operation. Note the huge storage

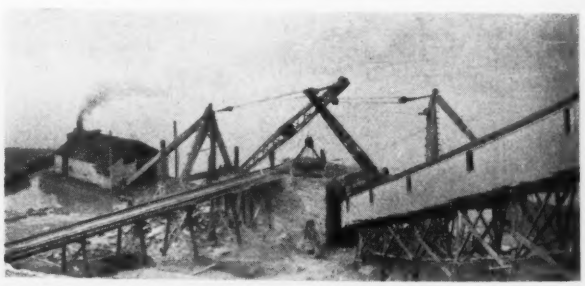
Material is excavated from the river by a dipper-type dredge equipped with standard Marion steam-shovel machinery, having a 1½-yd. dipper mounted on a 23-ft. handle. The hull of the dredge is 34 ft. wide, 86 ft. long, with a 4½-ft. draft, and is provided with three 16-in. by 32-ft. spuds—one astern and one on either side—driven by individual engines.



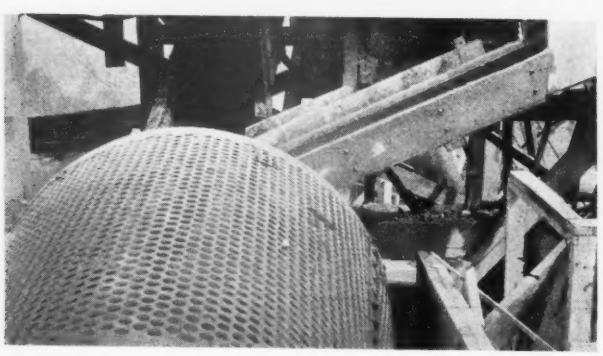
General arrangement and details of Knoxville Sangravl Material Co.'s plant at Knoxville, Tenn.



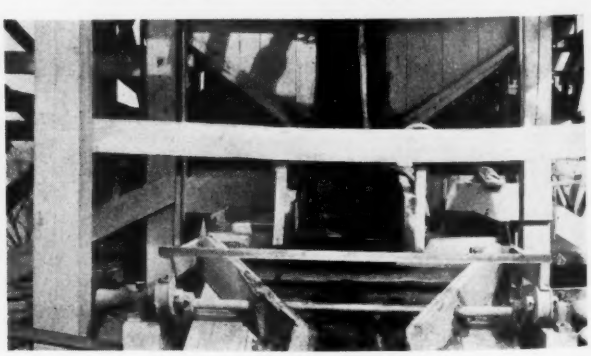
This dipper-type dredge digs all the material that goes through the plant



Two unloading derricks—one on a boat and one stationary—keeping the receiving hopper full



One of the two conical screens. A chute from the right leads from the crusher elevator



Flume leading from the second conical screen. Here the course sand is removed

The plant from the other side. The storage is 250 ft. long

flat screen goes through chutes directly to a bin of 300-ton capacity under the screens and the product of the settling tanks likewise is moved by gravity to separate bins. In all, there are six bins in the screening plant proper—three for gravel and three for sand. Hinged gates on one side from each bin permit side loading of railway cars and street cars. When cars are unavailable or when more materials are being produced than can be loaded, gates on the opposite

These truck-loading bins hold 300 yd. The elevator leads from the underground conveyor

side can be opened and the material allowed to discharge on a 20-in. belt conveyor of 140-ft. centers. This belt runs parallel to the row of gates of the six bins so that any size material can be fed to it in any desired quantity or any combination of sizes can be discharged on it. This conveyor elevates the material and empties it on a cross conveyor of the same width and 54-ft. centers, which in turn discharges on a 20-in. shuttle conveyor of 125-ft. centers.

As illustrated, the shuttle conveyor is reversible so that it can be made to discharge at any point in the storage. The storage being 250 ft. long, this 125-ft. belt can utilize all of it, as the cross conveyor empties on it midway of the storage. The carriage of the shuttle is self-propelling through the application of a wire rope on its snub-pulley. The opposite end of the rope is made fast to any point beyond the desired dumping-point.

The storage pile has a total capacity of 50,000 tons, accommodating several piles of each of the six sizes as well as piles for combinations of sizes. The material is removed from storage by an underground reclaiming conveyor 20 in. wide, of 290-ft. centers, which is housed in a roomy concrete tunnel. Sand or gravel is drawn from the storage through swing gates to a traveling hopper so that a consistent and uniform feed is effected to the conveyor itself.

Main conveyor, leading from hopper to screens, handles 600 yd. of material daily

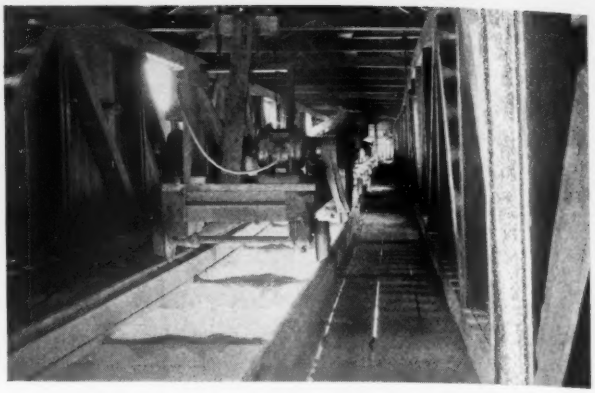
Material is discharged from the underground conveyor into the boot of a 16-in. belt bucket elevator of 80-ft. centers which empties into a hopper fitted with several chutes so that any grade material can be spouted to any one of six concrete bins from which trucks are loaded.

In addition to this group of bins there is a similar group having a total capacity of 300 yd. From these bins standard railway and street cars are loaded. This set of bins is served by a 16-in. conveyor which in turn is served by the reclaiming elevator.

This set of bins also has a capacity of 300 yd. and from it are loaded railroad and street cars

The plant as a whole has as its most prominent feature flexibility. This enables the company to get business that it could not otherwise enjoy, as there are many contracting companies which want special sizes and grades of material that cannot be obtained at the average operation. For instance, if the company receives an order for gravel with an unusually large amount of fines in it—100 per cent through a 1½-in. ring, retained on a ¼-in. ring, and 50 per cent through a ¼-in. ring—all that is necessary to do is to regulate the flow from

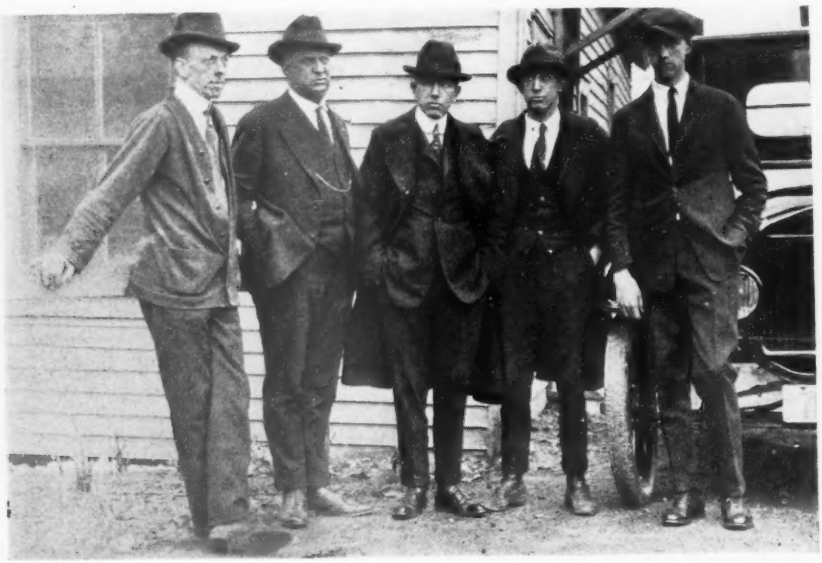
This conveyor is loaded from the screening-plant bins and takes the materials to storage



Reversible shuttle conveyor discharges at any point in the 250-ft. storage

two of the screening-plant bins to the conveyor and carry it to the shuttle conveyor and discharge it into an empty storage space below.

Also, the company's large storage capacity enables it to keep its orders filled at all times and customers are consequently not in want whenever the digging or other river



Left to right: C. S. Todd, secretary-treasurer and general manager; S. C. Gates, sales manager; F. P. Peeler, bookkeeper; John S. Boyd, Jr., salesman, and Roy Brooks, shipping clerk

equipment, or the screening plant, is "down for repairs."

The Knoxville Sangravl Material Co. is the successor to the Kinzel-Thompson Sand and Gravel Co. and has been operating under its new name since April 17, 1922. The present organization is made up of some of the most prominent men of the city of Knoxville and the company is recognized as one of the city's most substantial concerns. The officers are: W. J. Lang, president; Fred L. Conner, vice-president, and C. S. Todd, secretary-treasurer and general manager. S. P. Gates is in charge of sales.

Lime Manufacturers Lead Price Stabilization

NEW YORK CITY is facing a possible building tie-up owing to the exhorbitant demands of building-trades mechanics for increased wages. As is usual on such occasions, the building-trades unions are doing their best to produce a "smoke screen" by directing public attention to the prices of building material as the cause of present high building costs. It is a pleasure, therefore, to record how some progressive building material producers, led by two lime manufacturers, have nipped this allegation in the bud.

The New York *Times*, of May 14, states:

Barreled finishing lime interests in this city were the first to meet labor's defy to standardize their prices to the building investing public as a component of a similar movement on the part of organized building craftsmen, says the Dow Service Daily Building Reports.

Edward B. Page, New York manager of the Rockland-Rockport Lime Corp., one of the dominant distributors of barreled finishing lime in the eastern part of the United States, commending the attitude of labor in its willingness to forestall a general buyers' strike in the building industry, announced that his company had guaranteed dealers and distributors wherever his company served against any price change for his company's commodity from now until January.

C. J. Curtin, one of the leading manufacturers of lime in New England, advised the Dow Service Daily Building Reports at the week end of his decision to meet the situation as squarely as the labor interests have put it up to building investors, that, as far as Farnam-Cheshire finishing lime was concerned, he had already guaranteed the trade against a price advance for the rest of 1923.

The lime men tersely summed up their policy as follows: "The building industry needs more labor. It cannot wait for labor to come in by virtue of legislation affecting immigration. If labor is willing to take its place in line to insure a longer period of building prosperity and the mason material dealers can have adequate protection against price advances for the remainder of the year, there is no reason why this era of building prosperity should not continue. The postponement of government and other big building projects in a tight building market like the present one is salutary. Labor makes a conciliatory move; it invites building material manufacturers, dealers and contractors to meet them four-square purely for the purpose of insuring a continuation of prosperity in the form of building construction progress spread out uniformly instead of attempting it at a peak. The line is thus clearly defined for the entire building industry. It will remain to be seen whether the choice will be squabble or success.

LIME ASSOCIATION CONVENTION

THE fifth annual convention of the National Lime Association will be held at the Hotel Commodore, New York City, on June 13, 14, and 15.

The work of the convention will be devoted in a large measure to reports from the technical men of the research organization, and from the field engineers of the association.

Railways Promote Agricultural Lime and Limestone Sales

Through Agricultural Agents and Development Bureaus They Stand Ready to Give Producers All Kinds of Assistance in Educational and Promotional Work

THREE years ago this time, ROCK PRODUCTS pointed out the possibilities of co-operation between railway agricultural and development bureaus and producers of agricultural lime and limestone in developing a demand for these products. Since then, and recently in particular, the railway companies have become much more aggressive in promoting new business. A recent canvass of their activities in promoting the use of agricultural lime and limestone resulted in the following replies:

Illinois Central Railroad

H. J. Schwietert, general development agent, Chicago, Ill.:

The Illinois Central has always taken an active part in co-operation with the extension forces of the various state universities in the states traversed by this railroad system.

Limestone has been furnished for the purpose of demonstrating its value in connection with the growing of legumes and correcting the acid condition of the soil.

Agricultural campaigns are being held constantly, in which the value and importance of agricultural lime are emphasized. Moving-picture reels are used in this connection as well as charts, and literature is distributed bearing on the subject. (I am enclosing samples herewith.)

"Limestone Special" trains have also been run. Community co-operative limestone associations have been encouraged to build limestone sheds and where the lime was handled on a co-operative basis, and a plot of ground leased on which to build the shed, the rental was a nominal sum. This work will be continued.

The Burlington Route

J. B. Lamson, agricultural development agent, Chicago, Ill.:

I am very glad indeed to hear that prospects are good for a large sale of agricultural lime and limestone this year. Our railroad is co-operating with the county agricultural agents and state extension agents wherever we can to further the use of these products. We have recently agreed to haul three carloads of limestone from Louisville, Neb., to points on our line in Iowa, free of charge, for the Iowa Experimental Station. That limestone is to be used for demonstration purposes in communities where limestone is not in general use.

We have used limestone on some company-owned land, in order to make a demonstration in the use of limestone on alfalfa. We have endeavored at all times to interest farmers in the use of these products, although we do not have any literature on this subject at this time.

Chicago Great Western Railroad

T. A. Hoverstad, development agent, Chicago, Ill.:

I was agricultural commissioner for the Soo Line a great many years. During this time I distributed a large number of carloads of finely ground limestone. We established demonstration farms and we had splendid results. In this work I was working in co-operation with the state university.

I took up the same line of work two years ago when I took charge of the development department of the Great Western Railroad. I gave encouragement to the establishment of demonstration farms in Minnesota. This work is done in co-operation with the state university. Several demonstration farms has been established and we expect the first results this year.

Coming to more direct work that the Great Western Railroad has done, I held 45 farmers' institutes during the winter of 1921-22, speaking to about 7500 farmers. We always feature the importance of clover and the necessity of neutralizing the acidity of the soil by the application of ground limestone.

We held this past winter 70 meetings, speaking to 9180 people, and we featured the same work more strongly than we did a year ago.

The agricultural college at Ames will co-operate with the Great Western Railroad in demonstration work this summer. A great deal of the state of Iowa is deficient in lime, but a strong low lime area is in the southwestern part of the state.

I shall personally take an auto and the agricultural college will furnish one man and we shall probably spend a good deal of this summer on our line between Des Moines and the Missouri line. We plan to distribute a large number of cars of lime for demonstration and experimental purposes.

I drove about 3100 miles last summer in an auto, studying agricultural conditions. Much of this mileage was in Iowa. I found comparatively little clover and alfalfa was grown in the state. The state needs a great increase in leguminous plants. To make this possible, it will be necessary to apply a great deal of lime. It is fortunate that we have such a big supply in southeastern Minnesota and northern Iowa.

The New Haven System

B. Campbell, vice-president, New Haven, Conn.:

Agriculture in southern New England is not a very large factor in railroad transportation and this company does not maintain an argicultural agency, so-called.

The territory is so compact and the close acquaintanceship between the producers of agricultural limestone and representatives of the New Haven is such that it is a comparatively easy matter to confer and in a co-operative sense develop the agricultural limestone industry satisfactorily. The producers of this commodity are in close touch with the farming element and that fact, coupled with what is stated above, makes for a close constructive relationship.

Baltimore & Ohio

O. K. Quivey, general agricultural agent, Baltimore, Md.:

The Baltimore & Ohio Railroad has been giving a great deal of attention to the matter of limestone, endeavoring in every way to stimulate its use in the counties traversed by our lines. This work has been carried on by the agricultural bureau of the commercial development department under the direction of General Agricultural Agent O. K. Quivey.

Our first move was to offer to all county farm bureaus who desired limestone storage facilities the privilege of leasing on our right-of-way at such stations at which such sites are available, adequate ground for erection of a limestone storage bin. We have offered a special lease to such county farm bureaus at the low rate of $1 per year, plus taxes and assessments.

Recognizing that limestone application is largely a seasonal project, we have exerted our best efforts to supply cars to the manufacturers for the movement of this commodity during the peak season for application.

We have offered in all states traversed, and have arranged in four of them, limestone demonstration programs, taking each county as a unit, and arranging in that county through the State Agricultral College, county agent and with the aid of the limestone manufacturer, to conduct a "Limestone Week," with a limestone demonstration in a different part of the county each day, in which the quality of the material recommended is shown, rate of application discussed, and method of application demonstrated, together with different types of spreaders.

These demonstrations have been conducted largely for the purpose of focusing the attention of various communities on the matter of limestone, believing that by so doing a number of individuals will be moved to use limestone, either for the first time or more liberally.

The Baltimore & Ohio has not only gone out into the field, and through the above agencies named, arranged for these "limestone weeks," but has given free transportation to the commodity from the quarry to the point of application in each case where the commodity was being used for demonstration purposes.

The word "demonstration" may be a misnomer, and some have said that there was no need for demonstration work with lime-

stone, that we had passed the demonstration stage. This statement would seem to have little or no foundation in fact when we state that in a great many counties the first car of limestone ever to have moved into the county was the carload moved there gratis by the Baltimore & Ohio for demonstration purposes.

We are not claiming any immediate or spectacular results. The Baltimore & Ohio is content with working patiently but consistently along this line, with the belief that by so assisting and stimulating the farming communities to an increased use of limestone that it will eventually result profitably to them, and of course, profitably to the Baltimore & Ohio.

Maine Central Railroad

W. G. Hunton, industrial agent, Portland, Me.:

Maine is unfortunate in not having many deposits of high-grade limerock. For that reason, large areas of the agricultural sections served by our lines are handicapped by long haul. Through co-operation of the county agents and the Maine Central railroad, the lowest possible rates are in effect for ground limerock and agricultural lime.

Through the farm bureaus, I am making efforts to encourage local organizations to buy in carload lots for individual consumption. This, as you will realize, at the present time is in the demonstration stage, but it is gradually leading to an increased use and many farmers who a few years ago bought only a ton or so, are now buying by the carload.

On account of the large potato acreage each year in Maine, ground limerock is in great demand.

New York Central Lines

W. H. Hill, agricultural agent, Chicago, Ill.:

Our effort in the development of the use of agricultural lime and limestone is divided between the establishment of demonstration plots on individual farms under the direction of the soils departments of the respective colleges of agriculture and county agricultural agents; the organization of field days, or lime days; a circulation of motion-picture films, especially the film entitled "A Farm for Sale" produced by the Holden Co., Inc., of Peoria, Ill.; publication of posters; encouraging the establishment of local storage bins; encouragement of the handling of lime or limestone by co-operative shippers' associations and individual dealers and by personal contact of our extension forces with individual farmers.

Naturally the methods of attacking the problem by the different colleges varies and we therefore outline this work by states, as follows:

INDIANA

1921

County	Number of Demonstrations	Amount Lime Tons
Starke	40	80
La Porte	22	50
Tipton	20	44
Lake	20	50
Elkhart	15	45
Wabash	6	60
Dekalb	21	80
Marshall	17	50
Total	161	459

1922

County	Number of Demonstrations	Amount Lime Tons
Greene	24	48
Pike	11	100
Warrick	7	65
Total	32	213

1923

Fountain—Three carloads were distributed this week and we have not as yet a complete record on the distribution.

OHIO

1921

County	Number of Demonstrations	Amount Lime Tons
Ashtabula	4	40
Fairfield	2	30
Morrow	4	40
Hancock	4	40
Total	12	150

1922

Carroll	16	30
Athens	11	50
Fulton	8	48
Huron	4	40
Licking	8	40
Lucas	4	54
Meiggs	6	40
Morrow	13	45
Total	72	347

1923

Our program for 1923 in Ohio consists in establishing demonstrations in Williams, Defiance, Paulding, Van Wert, Mercer, Darke, Auglaize, Marion, Richland, Champaign, Clark and Madison counties; however, no actual deliveries have been made to date.

These Ohio demonstrations are being followed closely by Ohio State University under the direction of Dr. Firman Bear, and will continue to be so followed for a four-year period.

The desires of the county agricultural agents and college staff account for the wide variance in the number per county.

MICHIGAN

1921

County	Number of Demonstrations	Amount Lime Tons
Lenawee	10	20
Hillsdale	15	30
Barry	10	20
Eaton	11	22
Total	46	92

1922

Cheboygan	21	42
Otsego	20	40
Crawford	20	40
Ogemaw	23	46
Gladwin	20	40
Lapeer	18	40
Branch	15	40
Total	137	288

The above demonstrations in Michigan were established with the consent of the soils and crops department of the Michigan Agricultural College by the various county agricultural agents and our department. Such checks as are made on the results are being made by ourselves and the county agents.

During the summer of 1922 we developed a plan whereby the above mentioned department of the Michigan Agricultural College would co-operate in establishing demonstrations and following them over a four-year period. The plan embraces essentially the following features: The establishment of three and four-unit plots per county, including tests of commercial fertilizer on six one-tenth acre plots, each treated with equal amounts of limestone an untreated check plots; one acre without lime; one acre on which four tons of limestone is applied, and a two-acre plot treated to manure and two tons of limestone. This plan to be carried out in 21 counties, the limestone to be delivered during 1922 and 1923. Counties were covered as follows:

County	Number of Demonstrations	Amount Lime Tons
Ingham	4	40
Oakland	4	40
Van Buren	3	35
Jackson	4	40
Washtenaw	4	40
St. Joseph	4	40
Hillsdale	4	40
Lenawee	4	40
Total	31	315

The remaining 13 counties will be covered during this spring and fall. In fact, we have two carloads ready to roll.

ILLINOIS

1922

County	Number of Demonstrations	Amount Lime Tons
Saline	10	40

Our interest in Illinois is not one bit less than in the other states. However, Illinois has done far more work in promoting the use of agricultural limestone than any other state which we serve and since we have a limited force in our extension department it has been necessary to confine our activities to territory where we have the greatest mileage, etc. We hope that in another year our work can be developed in Illinois to the satisfaction of the co-operating forces and ourselves.

You will note that we have established 501 demonstrations using 1904 tons of agricultural limestone in four states. The attached maps give a more graphic picture of the extent of this work.

We also attach a copy of the poster which we issued for use in stations, banks, stores, schools and other public places where prospective limestone users might congregate.

We know this work has been effective, and while our check for results has not been completed we do know that on one division in a rather backward agricultural territory where the soils are predominately acid that our carload deliveries to farmers in 1921, when we first started to work on limestone, were 46 for the whole year; up to November 1, 1922, the deliveries were 107 carloads. We anticipate an even greater increase for 1923 over 1922 than was made in 1922 over 1921.

It has been our observation that agricultural limestone producers do not "push" their product strongly enough. However, we have had an excellent spirit of co-operation from every producer we have approached for assistance in establishing our demonstrations.

It is our opinion that these demonstrations will begin to yield their best results in the

second year after establishment; in other words, our 1921 work will begin to bring results this year.

We hope to establish demonstrations in every agricultural county we serve and will continue our effort with that end in view.

Northern Pacific Railway

H. W. Byerly, general immigration agent, St. Paul, Minn.:

Relative to the demand for lime and limestone, and in reply I beg to advise that we have not had any recent campaign on this work, but we are very much interested in the increased use of lime and limestone, especially in some of our Minnesota territory which, with the use of such products, may be changed from potato-raising districts to districts producing alfalfa and live stock.

George Kelley, the editor of the *Northwest Farmstead*, Minneapolis, Minn., is carrying on an active campaign along this line. Our F. Benz, agricultural agent, is what might be termed a special development agent rather than a strictly agricultural agent. I do not know that we are in a position at this time to make any special campaign, but I will discuss the matter with Mr. Benz at the first oportunity.

Lehigh Valley Railroad

P. H. Burnett, industrial commissioner, New York City:

There is a county agent in every county along the line of our road, and they seem to be doing splendid work. A few years ago the railroads did a great deal of work along these lines and spent a great deal of time and effort in locating the county agents in the various counties along the line of our road. Now that these agents are thoroughly established and equipped to carry this work on our road, I for one, have thought it not wise to duplicate.

We do, however, assist in every way possible to promote and encourage the agricultural work.

Rock Island Lines

Arthur W. Large, agricultural agent, Chicago, Ill.:

We are so extremely busy with our great Pan Handle-Rock Island Lines Agricultural and Community Life Institute to be held at Amarillo, Texas, June 7-8-9, that I do not have time to write you in line with your letter of April 17. There is a wonderful field for the manufacturers of all the things mentioned on your letterhead. I always give them more opportunities to present their cause to the public than they take advantage of. We must recognize that the time has come for permanent buildings and permanent agriculture, which means fertilizers, lime, etc.

Would it not be possible for you to come to the great Amarillo meeting as a representative of some of these manufacturers and present this great subject at that meeting, where there will be delegations from 38 towns, such representation would have to be at the expense of such organizations which you represent. We will be delighted to place your name on the program accordingly and give you an excellent position and ample time to develop your subject.

However, such representation would not include the cement people, as they are always fully represented in our campaigns.

[N. B. The secretaries of the National Lime Association and the National Agricultural Limestone Association were advised of the above invitation and urged to send representatives to the Texas meeting.—N. C. R.]

Nashville, Chattanooga & St. Louis

L. P. Bellah, general agent, Nashville, Tenn.:

I am pleased to say that this company is alive to the importance of the use of lime by the farmer, so much so that it has been actively engaged in encouraging the use of lime for some years. I am taking the liberty of enclosing to your address a copy of the booklet devoted to the use of lime, which was compiled and published by this department and distributed among many farmers along these lines. We also advocate the use of lime in our marketing work through advertising in all the country newspapers, and have arrangements by which we direct the inquirers to sources and supply.

Delaware & Hudson Railroad

George E. Bates, assistant to the vice-president for industrial development:

Would advise that the development department of the Delaware & Hudson Railroad has for many years been greatly interested in the necessity of ground limestone being used on the farms in the territory served by such railroad. We feel that we are most fortunate in the fact that we have, at various locations along our line, large deposits of limestone which analyze equal to the limestone throughout the United States and such deposits are being developed by several limestone companies who make their main business crushed stone and thereby produce an excellent quality of ground limestone for the use of the farmer. These concerns are well known throughout the D. & H. territory and are spending considerable money in advertising, provide their own facilities at destination and keep in close touch with agriculture. You will therefore note that there is no necessity for this department to do anything other than to have our representative continually keep ground limestone before the farmers and encourage their increasing use of this product on their land.

Chesapeake & Ohio Railway

C. J. Jeline, agricultural agent, Richmond, Va.:

This department is devoting a great deal of its time and efforts toward bringing about an increased use of agricultural lime in our territory. During the past few years we have, through farmers' meetings, etc., brought about the construction of 75 lime storage bins at different points along our line. These buildings were financed mostly by farmers' organizations, the railroad company leasing them a site for same at rental of $1 per year in order to encourage the use of lime.

In addition to this we have held several lime demonstrations along the line, at which time a carload of lime was donated for demonstration purposes. By this means we have had excellent results. At one point on the Peninsula we can trace 35 carloads of lime being shipped into that territory as a direct result of one of these demonstrations.

In the past we have also distributed among the farmers large quantities of alfalfa seed, which was sown under our direction, the directions calling for the application of lime. In this way we were able to show the farmer on his own land just what results lime would bring about, as well as convince him that alfalfa could be successfully grown in our territory.

During the year 1921, 571 cars of lime were used by our farmers. During the year 1922, 951 cars of lime were used, making an increase of 380 cars over the previous year. From all indications at the present time, it looks as though this will go to 1500 or 2000 cars during 1923.

Further, in addition to this, we publish each month a Market Bulletin, which is sent to about 14,000 farmers along the C. & O. We try in each edition to have some reminder of the necessity of using agricultural lime.

At this time we are glad to say that we have secured full co-operation of the county agents in our territory and through their help we are getting excellent results. We have also arranged with manufacturers of ground limestone to supply farmers with lime on easy terms—from six months to a year. Also, where those in charge of the community bin are not in a position to advance the money to purchase the lime for their bin, we have arranged with the manufacturers to put a supply of lime in the bin, allowing the farmers to pay for it as it is distributed from the bin.

We are doing everything possible to teach the farmer the necessity of using lime.

Atlantic Coast Line

G. A. Cardwell, agricultural and industrial agent, Wilmington, N. C.:

Appreciating the fact that most of the land in the South needs lime, this department has consistently, over a period of several years, advocated the use of liberal quantities of lime on the soils. We have done everything possible to carry this message to the farmers in our territory, and have extended information as to sources of supply, prices, rates, etc., in order to make it easy for those interested to decide upon the kind of lime to be used, and where it could be bought at lowest price, taking into concideration all determining factors.

Chicago, St. Paul, Minneapolis & Omaha Railway

F. S. McCabe, general development agent, St. Paul, Minn.:

I have been working with county agents in Wisconsin with regard to an increase in the distribution of agricutural lime and limestone, but have not started a very close campaign. County agents are doing fairly well and more or less limestone is moving into our territory. The farmers have not been in a financial condition to purchase very much for the past year or two, but I am in hopes that conditions will be much better this year so that in the future a greater supply of lime and limestone can be purchased by farmers.

Atchison, Topeka & Santa Fe Railway

J. F. Jarrel, manager, agricultural development department, Topeka, Kan.:

Ever since the war we have been working in co-operation with the state agricultural colleges in an effort to bring about more and better farm production. This work is done largely by means of demonstration trains, and at every stop the fact is brought out that we in the Southwest are soil robbers and that we will continue to suffer until we face about and become soil builders. It is rather uphill work in most of our territory for the reason that so much land is comparatively new.

Boston & Maine Railroad

E. W. Abbott, general freight agent, Boston, Mass.:

The situation on the Boston & Maine Railroad, insofar as this kind of work is concerned, is such that the freight traffic department handles the details in connection therewith. In other words, it is our practice to furnish information to interested parties

upon receipt of inquiries for the location of special limestone and other mineral deposits, nature of the soil, etc., which work is in conjunction with our regular industrial work.

We have division freight agents located throughout our territory who are familiar with the various requirements of shippers and consignees, and are continually in touch with such parties for the purpose of rendering all assistance possible in stimulating the movement of traffic over our line.

The Delaware, Lackawanna & Western Railroad

Allen S. Merchant, agriculturist, Binghamton, N. Y.:

I have given several lectures on the value of using lime for soil improvement and greater production. In my talks with individual farmers I have often referred to lime and its value and have done all I could to encourage its use.

From the shipments of lime into our territory this spring I am inclined to believe that our farmers are using more this year than in any previous year. I believe that there is nothing the farmer can invest in which will give greater returns in the way of soil improvment and greater production than the use of agricultural lime.

Southern Railway System

Roland Turner, general agricultural agent, Atlanta, Ga.:

The agricultural branch of the development service of the Southern Railway System has recognized that the matter of the use of agricultural lime and limestone is largely a matter of education insofar as the territory served by our system is concerned. We have therefore in our regular work for years advocated livestock growing, growing of legumes, primarily for feeding and also for renovating purposes, and have strongly advocated the use of lime in connection with the use of livestock manures and legumes in soil improvement.

It has been our belief for many years that it would be a great help in the educational work necessary to be done to have available at as nearly as possible all points a supply of limestone so that any farmer who might become interested in the use of lime would be enabled to secure a quantity sufficient to lime an acre or two and thus prove upon his own farm and under his conditions the value thereof. We have expressed these views to our friends among producers of limestone for agricultural purposes and in some instances have co-operated insofar as we have been able with producers who have proceeded to follow this idea.

Therefore, I may say our work has been in a way general, we having been so situated as to make it practically impossible to do as much in a definite way as we would have liked. In the entire South the livestock idea is developing rapidly and in connection with more livestock, greater quantities of forage are being produced, which means in the South greater quantities of legumes. Farmers are steadily acquiring information regarding the value of limestone upon their lands. We believe one of the most effective measures that could be taken to aid in the educational work necessary would be to provide local stores of agricultural lime so that any time a farmer desired to use a small quantity, he would be able to do so without the necessity of either buying a carload or interesting his neighbors in going in with him and handling a full car.

Louisville & Nashville Railroad

G. A. Park, general immigration and industrial agent, Louisville, Ky.:

We have no statistics available showing the amount used or sold, nor have we any means of knowing the quantity or amount of supply or demand.

Limestone is prevalent in a very large portion of the territory served by L. & N. rails and quarries may be found at many points extending as far south as Calera, Ala., and limestone is found in great abundance. Some of these quarries only produce building stone or ballast, but a number of them are also equipped to furnish limestone for agricultural purposes.

National Railways of Mexico

J. B. Rowland, industrial agent, Mexico City:

This company has just started some agricultural projects which will deal with the developing of agriculture in the country, but there are so many problems in Mexico at the present time which are so much more important than the matter of limestone it will undoubtedly be some time before there is a demand for this product.

The fertilizer business in Mexico has never been developed. We have in the republic wonderfully rich deposits of rock phosphate and mountain upon mountain of limestone, available for agricultural use when the time is ripe for exploitation.

The only people that I know of who are doing any promotional work in Mexico is the Nitrate of Chile Committee of London, and owing to the scarcity of their product and the high cost of transportation there is very little nitrate being used in the country. Most of the guano deposits have been worked, or the guano has fired in the caves and is not of first quality.

However, our railroad hopes as soon as possible to establish some experimental fields along their lines, which, properly managed, will show what can be done by the use of fertilizer.

New Plant for Making Green Facing Aggregate

THE rock at the quarry of the Emerlite Surfacing Products Co., Ely, Minn., is a sort of trap rock, but you must not confuse it with the ordinary trap rock, which has a brown appearance outside and when crushed is a sort of blue or slate color. This material has an absolute green color in the mountain, and when crushed down to the marketable sizes, it is a very beautiful green shade, almost a pea green. The dust or waste when lying on the pile show some beautiful color effects when the sun is shining on it, and when it is wet it has an absolute moss color. A. C. Hall is the general manager and principal owner of the plant, and he has devoted many years of his life to the crushing of stone down to granules. But he still believes that he has not reached perfection, and is experimenting all the time to find out how to bring the stone down to granules without making too much dust, which is waste.

When finished the material has somewhat the appearance in size of buckwheat, and in fact all of it has passed through a 10-mesh and over a 20-mesh. It is used as a roofing granule. The Emerlite people own several plants. As the winters are long up here, Mr. Hall's intention is to mine into his mountain, and thus the men can work all winter, and as the plant is entirely enclosed, the winter storms will not affect them.

At the present time, the initial crusher is a geared gyratory crusher which discharges into a small elevator, which in turn discharges into a 36x16-in. smooth roll crusher. This installation is being taken out, however, and in its place the Kennedy-Van Saun Manufacturing and Engineering Corp., of New York City, is now installing a No. 37 AA gearless gyratory crusher which is ideal for this kind of work, as it takes the place of both of these previous machines, reducing the stone down to 1-in. and finer and very much reducing the percentage of dust which is made by the two present machines. The material will be passed from the gearless crusher over a screen which will remove everything that is finished to ⅛-in. and under, and this will be approximately 50 per cent. The larger sizes then are discharged into a Sturtevant ring roll pulverizer. This makes a reduction to approximately ⅜-in. and the material is then passed to smooth-faced finishing rolls which are set at a trifle over 10-mesh, and bring the material down to the required size for marketing.

There is a lot of screening done in this operation—in fact the material is screened between each operation. The result of this crushing, screening and re-crushing is that almost 40 per cent of the material will pass through a 20-mesh and as at the present time there has been no market for this size, it is considered a waste and has to be piled out in the field with a small conveyor. Mr. Hall is now laying plans to add another unit alongside the present one; the No. 37 gearless crusher has enough capacity to supply both units.

Mr. Hall has succeeded in installing machinery that will secure as clean a separation as I have ever seen produced, but is forever planning to accomplish the desired results without producing so much waste, and the Kennedy-Van Saun Corp. is now designing a complete plant to be installed close to the present one, with the object of reducing the waste to a minimum.

This material is shipped in box cars, loaded about half way up, and they have to be lined with heavy paper to prevent leakage. The company ships from two to four cars a day.—W. J. C.

Cement Transit Forbidden by I. C. C.

THE I. C. C., in a report on I. and S., No. 1727, Rules for Storing and Sacking of Cement in Transit at Davenport, on the Chicago, Rock Island & Pacific, opinion No. 8423, 78 I. C. C. 693-8, has held unjustified the proposal of the Rock Island to permit transit for storing and sacking on cement at Davenport, Iowa, for six months, at a charge of 2.5 cents for the privilege, in addition to the through rate from point of origin to final destination, provided both inbound and outbound movements were over its rails.

It forbade the transit on the ground that would amount to an undermining of the rate structure prescribed by it under authority of Section 15a.

In the head note of its report, the commission called the proposal unlawful. Inasmuch as it makes its own reports, the head note is not of the character of the head notes preceding the opinions of the U. S. Supreme Court. The head note in this case and the text of the opinion may be regarded as supplementing each other.

At the hearing four manufacturers of cement, operating eight mills, and four contractors and dealers in cement appeared in support of the proposed arrangement. Twenty-two manufacturers, operating 54 mills, appeared in opposition. Of the railroads the Burlington supported the Rock Island. The Minneapolis & St. Louis, the Chicago Great Western, and the Illinois Central appeared in opposition.

The Rock Island and those advocating its plan said it would be in the interest of car conservation to have cement moved to convenient places of storage and then sent on to consuming points; that such an arrangement would obviate the necessity for the establishment of two mills. At Davenport it was pointed out the inbound tonnage of grain and other commodities exceeded the outbound, resulting in the accumulation of empty cars during grain-shipping season.

The Rock Island pointed out that the transit charge would yield from $20 to $27.50 per car and that if at slack times cement were taken to the storage points near the points of final destination, the transaction would be beneficial not only to the carrier but also to the users of cement, because it would give it a revenue on a car of transitted cement from $20 to $27 greater than on a car moving direct to the final destination, without any outside switching because the privilege was to be limited to movement between points on the rails of the carrier granting it.

The Marquette Cement Co., which asked for the transit privilege, with a mill at LaSalle, Ill., said that a large part of its product had to be milled during the eight months' period, April to November inclusive, and that approximately 40 per cent of its product was called for during August, September and October, and that many times its output had been limited by shortage of cars at the mills during those months.

In answer to that the protesting cement manufacturers and railroads pointed out that in August, September and October, 1922, only 28 per cent of the Marquette's output was shipped and that at the close of October it had in stock only a negligible quantity of cement. The Marquette company said that in anticipation of the arrangement it had in course of construction a warehouse of 200,000 bbl. capacity at Davenport. Other mills said they also had in contemplation the erection of warehouses.

Carriers opposing the establishment of the privilege said the schedule would tend to develop the shipment of cement to intermediate points and that reshipment later to ultimate destination would entail greater use of cars to perform the same amount of transportation than direct shipments from mill to points of consumption; that the availability of large stocks in storage would tend to discourage the carrying of reasonable stocks at points of consumption; that the efforts of carriers to bring about more uniform shipments during a longer period of the year would be defeated by storage; that the arrangement would involve two complete transportation services and that the charge of 2.5 cents would be inadequate for the service intended to be covered. In disposing of the case the commission said:

Cement is sold at a price delivered at the consuming point, so that the freight charges are an important item in the cost of production and marketing. In view of this fact many of the large cement manufacturers have established chains of mills at strategic points throughout the country to meet the competition of local manufacturers in the general consuming territory. It is apparently this situation that is responsible for the desire of the Marquette Co. to have the benefit of transit at Davenport, and whatever its purpose may be it will obviously serve to lessen the force of competition from the two new cement plants now under construction at or in the vicinity of Davenport.

So far as the record shows, there is no substantial demand for transit on cement. On the contrary, a large majority of the cement manufacturers throughout the country and many of the carriers are opposed to it on the ground that there is no commercial necessity that requires transit on cement and that its establishment will impose a heavy burden on both the manufacturers and the carriers.

In addition to respondent the several mills in the LaSalle district are served either directly or by means of a switch movement by the Chicago, Burlington & Quincy; Chicago, Milwaukee & St. Paul; and Illinois Central, and of these the Chicago, Burlington & Quincy and respondent both reach Davenport.

There is keen competition between the carriers for the cement traffic originating in the LaSalle district, and it is not improbable that if the proposed schedule be made effective respondent through that agency alone would secure a substantial share of the competitive traffic. Additional transportation would be required under the proposed transit arrangement. The only transportation necessity advanced in support of the arrangement is alleged car conservation. It is not clear how this could be accomplished by establishing transit on cement at Davenport. The LaSalle district is in the same general territory as Davenport, and what would affect one point in times of car shortage would equally affect the other.

We have said that our authority under section 15 (a) to prescribe just and reasonable rates and to initiate, modify, establish or adjust rates is not a mere transitory authority to establish in the first instance a general rate structure calculated to produce a fair return, but is a continuing authority to see to it that such a rate structure shall not be undermined and its purpose thwarted by new rates, either increases or reductions, proposed by particular carriers for the purpose of augmenting the traffic of such carriers. Trunk Line and Ex-Lake Iron Ore Rates, 69 I. C. C., 580. It is clear that the establishment of transit at Davenport would be followed by similar transit arrangements at Kansas City and Omaha and other important points. If, as clearly appears to be the case, competition would force carriers in all parts of the country to establish transit on cement on such a scale, the effect would be to undermine the existing rate structure. Furthermore, the testimony of witnesses for numerous manufacturers indicates that there is no necessity which requires transit on cement at Davenport.

We find that the proposed schedule has not been justified. An order will be entered requiring its cancellation and discontinuing this proceeding.

Commissioners Eastman, Potter and Campbell dissented.—*Traffic World.*

Concrete Brick

AGGREGATE producers who would like to visualize the possibilities of concrete brick—more particularly face brick—should send for a new booklet, recently published by the Shope Brick Co., Portland, Ore.

The main object of the book is to present a plan whereby cities, large or small, may establish an industry for the manufacture of concrete face and common brick under the Shope process. In its 40 pages are shown many fine examples of modern structures—residences, colleges, schools, apartments, office and business buildings, factories, etc.—many of them showing in color the type of brick used in their construction. The color work is excellent and reflects the true tints used in the actual brick.

A noteworthy feature is the Norman tile brick, first introduced by the Normans into England in the 10th century; also, a beautiful mantel of brick and tile in Mr. Shope's home in Portland showing a warmth of color and texture and richness in design that harmonize well with the home's interior.

Useful data and results of crushing tests made by Columbia and Johns Hopkins universities and the University of California are also included.

Many New Cement Projects

Two New California Plants, One at Manitowoc, Wis., and One in Colorado the Week's Grist—Santa Cruz Doubles Capacity

WITH about a dozen new cement plants in various stages of construction, the news of a single week brings to light four new projects. Two of these are in California, one in Colorado and one in Wisconsin.

The Wisconsin project is backed by J. B. Johns, vice-president of the Newaygo and the Petoskey companies in Michigan, by H. Vanderwert, sales manager of the Petoskey company, and by local shipbuilding interests. The plant is to be built on waterfront property now owned by the ship-building company. Limestone is to be brought across the lake from the Michigan peninsula, since no high calcium limestone has ever been discovered in Wisconsin. Likewise cement will be shipped by boat to various lake ports.

A Milwaukee newspaper dispatch of recent date states: "Whether the proposed $1,000,000 cement plant will be located in Manitowoc now rests with the city council. Upon that body's action relative to dredging the river so that large freighters can reach the docks adjacent to the plant site, establishment of the enterprise hinges, according to J. B. Johns, vice-president of the Newaygo Portland Cement Co., and H. Vandewart of the Petoskey Cement Co., who are associated with local men in the project.

"The council has advertised for dredging bids. If the aldermen vote to proceed with the work the plant will be assured, it is stated."

Colorado Project

From Pueblo, Colo., comes the following rumor: "Pueblo county is to have a new industry in the form of a large cement plant, the company being capitalized for $1,500,000.

"Property of the new company, consisting of a large acreage of high test ground, located near the mouth of Beaver Creek, on the Arkansas river, about a fourth of a mile east of the Pueblo-Fremont county line, includes the old Hobson place, the Carlile ranch and adjoining tracts of land. The company is reported as being an independent organization."

Two California Projects

The Yosemite Cement Co., near Mariposa, Mariposa county, is reported to have acquired 1500 acres of property in the San Joaquin section, and to have purchased machinery and equipment for a $1,000,000 plant. The Hunt Engineering Co., Kansas City, well-known cement-plant engineers, will have charge of design and construction.

Agricultural lime also will be an important product of the Yosemite Cement Co.

Contracts for the purchase of the lime have been entered into with Agricultural Lime and Compost Co. of San Francisco, with offices in the American National Bank Building. J. E. Monroe, an official of the lime company, has said that his company was not interested financially in the cement corporation but has agreed to purchase the lime output.

The Yosemite company, Mr. Monroe declared, has unlimited financial resources.

The men who have organized the Yosemite company control one-third of the cement output of the Middle West and have stock ownership in several California companies, but the proposed San Joaquin development is the first entry of this group into the California field as an independent unit, it is said.

John F. Humburg, former vice-president and general manager of H. Hackfield & Co., merchants and shippers of Honolulu, H. I., is heading a syndicate of San Francisco business men and bankers to underwrite to the extent of $4,000,000 the establishment of what is claimed will be the largest portland cement industry in the West near Exeter, Tulare county, Calif., according to an announcement by William F. Humphrey, of Lent & Humphrey, San Francisco, counsel for the new corporation. Mr. Humburg now heads the California Copper Corp. and is vice-president of the Engels Copper Mining Co. The new syndicate will operate on a quarry at Three Rivers, on Marble Mountain, in the San Joaquin valley, said to be the largest and highest quality limestone deposits, accessible to transportation on the Pacific Coast.

Santa Cruz Plant Expands

The Santa Cruz Portland Cement Co. is doubling the capacity of its big plant at Davenport, Calif. The company's cement mill, which is the largest on the Pacific Coast, will be in full operation within the next 60 days, the transfer of the machinery from the Standard Portland Cement Co.'s plant at Napa Junction, the Santa Cruz company purchased at the close of the war, having just been completed.

This Davenport plant will have a capacity of 10,000 bbl. a day, the increased output being necessary to meet the constantly growing demand for materials used in the great construction activity now under way in California. The combining of the modern machinery of the Davenport and Napa Junction plants into one, together with the addition of new equipment, gives the mill sufficient capacity to care for the cement requirements of this coast for years to come, it is claimed. The plant has a battery of 18 kilns under one roof.

The decision to increase its plant capacity was warranted by recent surveys and reports by the company's engineers which show that it has an ample supply of limestone for the next 50 years. More than 500 men are now employed in putting the finishing touches on these extensive additions and betterments.

During the past year the Santa Cruz Portland Cement Co. furnished cement for the Hetch Hetchy and Don Pedro dams. Nearly 750,000 bbl. of cement were used in the latter project.

The growth and progress made by the Santa Cruz Portland Cement Co. in recent years have been the noteworthy developments in California's industrial life, says a San Francisco newspaper. There is no better measure of the company's advancement than is to be found in the record of its stock in the local market. Starting at 35 a few years ago, the stock has advanced gradually during this period, with a few minor fluctuations in sympathy with outside affairs, until it is now quoted around 100 bid.

North Carolina Rumors

The Winston-Salem (N. C.) *Sentinel* of May 4 prints an interesting item, which is reprinted below:

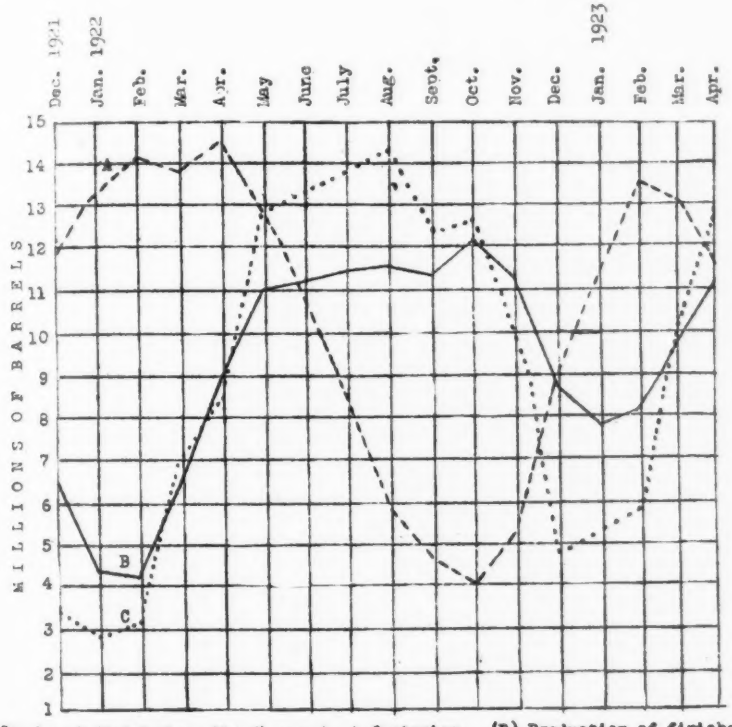
"Fred B. Franks and L. B. Walters, of Allentown, Pa., officials of the Bath Portland Cement Co., one of the largest concerns of its kind in the country, spent the day in the city with A. S. Hanes, member of the State Highway Commission, discussing with him the possible establishment in this state of a large cement plant.

"Mr. Hanes is particularly interested in seeing such a plant established, if possible, because of the state's great demand for cement in its road-building program.

"Mr. Franks, who is first vice-president of his company, stated that he and Mr. Walters were looking over the field with a view to seeing if there was available in this state suitable material sufficient to justify the establishment of a large cement plant. There are certain very definite requirements for the location of such a factory and the two visitors and Mr. Hanes are hopeful that they will be able to find what is needed in this state."

Portland Cement Output in April

THE statistics shown in the following tables, issued by the Department of the Interior and prepared under the direction of Ernest F. Burchard, of the Geological Survey, are based mainly on reports of producers of portland cement but in part on estimates. The estimates for April, 1923, were made necessary by the lack of returns from two producers.



(A) Stocks of finished portland cement at factories. (B) Production of finished portland cement. (C) Shipments of finished portland cement from factories.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT BY DISTRICTS IN APRIL, 1922 AND 1923, AND STOCKS IN MARCH, 1923, IN BARRELS

Commercial District	Production April 1922	Production April 1923	Shipments April 1922	Shipments April 1923	Stocks at end of April 1922*	Stocks at end of April 1923	Stocks at end of March, 1923*
Eastern Pa., N. J., and Md.	2,568,000	2,996,000	2,529,000	3,554,000	4,306,000	3,778,000	4,336,000
New York	434,000	514,000	470,000	624,000	1,000,000	804,000	914,000
Ohio, Western Pa., and W. Va.	801,000	1,145,000	701,000	1,247,000	1,396,000	1,042,000	1,144,000
Mich.	476,000	551,000	420,000	598,000	812,000	624,000	671,000
Ill., Ind. and Ky.	1,398,000	1,924,000	1,228,000	2,405,000	2,542,000	1,304,000	1,786,000
Va., Tenn., Ala., and Ga.	566,000	573,000	535,000	635,000	518,000	213,000	275,000
Eastern Mo., Ia., and Minn.	1,055,000	1,018,000	781,000	1,197,000	1,834,000	1,692,000	1,870,000
Western Mo., Neb., Kan. and Okla.	526,000	855,000	554,000	940,000	856,000	884,000	968,000
Texas	290,000	360,000	278,000	347,000	344,000	285,000	272,000
Colo. and Utah	173,000	245,000	161,000	218,000	170,000	163,000	136,000
Calif.	697,000	917,000	741,000	924,000	335,000	139,000	146,000
Ore., Wash. and Mont.	259,000	261,000	194,000	265,000	360,000	522,000	527,000
	9,243,000	11,359,000	8,592,000	12,954,000	14,470,000	11,450,000	13,045,000

*Revised.

Stocks of clinker, or unground cement, at the mills at the end of April, 1923, amounted to about 5,007,000 bbl., compared with 5,174,000 bbl. (revised) at the beginning of the month.

$50,000,000 Fertilizer Merger Plan

A MERGER of leading fertilizer companies, involving a capitalization of approximately $50,000,000, is pending, says the New York correspondent of the Cincinnati *Star*. John J. Watson, Jr., vice-president of the International Agricultural Corp., which with the Davidson Chemical Co. is expected to form the nucleus of the consolidation, says that plans for bringing other companies into the combine are being discussed in the belief that present conditions in the industry afford an excellent opportunity to bring them together under one management.

It was stated that neither the American Agricultural Chemical nor the Virginia-Carolina Chemical companies will be included. The independents named as likely to enter the merger are the Phosphate Mining Co. the Standard Acid Phosphate Co. of Baltimore; the Federal Chemical Co., Louisville, and the Reed interests, of that city. It also was reported in the financial district recently that the fertilizer department of Swift & Co. has been approached.

The purpose of the proposed merger, according to the promoters, is to stabilize the fertilizer industry; which, despite prosperity in other lines of business, is not operating on a profitable basis.

New Appointment of Car Service Division

THE American Railway Association, Car Service Division, has appointed R. W. Edwards manager of the division, with headquarters at Toledo, Ohio, effective May 1. Mr. Edwards will have the authority of the division in Michigan, Indiana, Ohio, Pennsylvania, New York and Ontario.

The Sentinel Poppies

By Robert Bell McKendry

"A Memorial to Our Heroes Beneath the Poppies"

In Flanders' Field the sentinel poppies stand,
On hillside and valley, and all thro' the land;
Watch and ward sweet they keep o'er the graves of our dead,
A greeting of love held in each bobbing head.

When the winds chant a dirge for the valiant who rest,
In the soil that their blood has eternally blest,
The brave little poppies keep time with the hymn,
Nodding and bobbing with rhythm and vim.

And sometimes kind Heaven weeps over each bed,
In sorrow, t'would seem, for the lives that were shed,
Then, drooping their proud heads, the poppies bend low,
And mingle their tears as they sway to and fro.

And when chill Winter wraps her pure mantle of white
Round the forms of the brave lads who fell in the fight,
The poppies creep under the blanket of snow,
And cheerily whisper to lov'd ones below.

And so through the years the sweet story will be,—
How in sunshine and rain, or when storms cross the lea,
The sentinel poppies their faith-vigil keep,
O'er the couch of our boys as they take their long sleep.

Mourn not. then, and grieve not because they are gone;
Their valor will live in both story and song;
How to make the world safe no ground did they yield,
As they fell 'mid the poppies on red Flanders' Field.

And as their pure heart blood seeped down thro' the sod,
It was eagerly drank of the poppies—and God
Blessed the giving,—an immortal shield,
To guard well the memories of grim Flanders' Field.

Sand and Gravel Men Hold Special Meeting

Executive Committee Meeting of National Association on May 16 Results in Decisions to Incorporate, Establish Standard Cost-Accounting System, and Give Advisory Assistance to District Associations. Report Shows Excellent Financial Condition

AT 5 o'clock Wednesday afternoon, May 16, at the La Salle Hotel, Chicago, was adjourned one of the most successful meetings ever held by an executive committee of the National Sand and Gravel Association. Many issues were submitted by President Dann and all were given serious and complete discussion and were satisfactorily disposed of.

The executive committee (left to right): T. R. Barrows, John Prince, Hugh Haddow, Jr., Alex W. Dann, R. C. Fletcher, W. L. Smith and E. Guy Sutton

One of the first questions was whether the association should render aid to district associations, and if so, how and to what extent. It was agreed that practically the most valuable assistance the National Association could give such associations would be in matters relative to freight-rate adjustments. It was therefore moved that the association give assistance to associations needing its aid and that it pay for the services of an expert to prepare data and attend trials and hearings in behalf of district associations, the extent of the expert's services rendered to be left to the discretion of the president. Embodied in this recommendation was a clause that the association assisted should pay the expenses of the man sent out by the National Association and also his salary and expenses while assisting in specific cases.

After a discussion of the merits and cost, it was unanimously agreed that the association become incorporated. Secretary Barrows advised that all preliminary preparations had been made for this procedure and it was voted that he be authorized to have the association incorporated in the District of Columbia.

The subject of a standard system of cost accounting received much consideration and more constructive ideas were offered in its discussion than were given to any other issue. It was pointed out that there are three distinct types of operations in the industry and that it would be impossible to draw up a system that could embody all the details of every plant. It was the consensus of opinion of those present, however, that an outline of a system could be drawn up which could be submitted to members as a guide which would serve to impress upon them the merits and necessity for some form of cost-keeping.

Mr. Haddow was appointed chairman of a committee comprising the members of the Executive Committee to draw up a form. Mr. Prince suggested that W. E. Johnson, secretary of the Missouri Valley Association of Sand and Gravel Producers, would be glad to assist in the work, having drawn up a satisfactory system for his own association. A recommendation was made that forms of the new system be sent to members monthly and that it be published in the *Bulletin*.

Following the luncheon the committee was given a very instructive and interesting talk

by John S. Burchmore of the law firm, Walter, Burchmore, Collin and Belnap, Chicago. Mr. Burchmore represented the association in its recent Central States rate case and in his talk to the committee he made plain the rate situation as applied to specific cases and to the country as a whole.

In a general discussion of the car supply for the coming fall, a summary of expressions was to the effect that the shortage will not be as severe as that experienced last year, it being pointed out that the movement of coal is, and has been for the past few months, heavier than in any other year, and that contractors in anticipating another shortage have been filling their storage yards.

Mr. Sutton read extracts from the proceedings of the last meeting of the American Society for Testing Materials, held in New York, which he attended in his capacity as secretary of Committee C-9. He advised of having been instrumental in changing the proposed definition of sand. The definition submitted to the society was to the effect that sand is a product of disintegrated rock. Mr. Sutton's recommendation that the definition be in effect that sand is a product of *naturally* disintegrated rock was accepted and now stands tentatively as the final definition. This change was made to offset the possibility of stone screenings being classed as sand.

The mechanical analysis of sand proposed at this meeting attended by Mr. Sutton, which now stands as a tentative recommendation of standard specifications of the American Society for Testing Materials, provides that 100 per cent pass a ⅜-in. ring, 85 per cent pass a No. 4 sieve and not more than 30 per cent pass a No. 50 sieve. The analysis of coarse aggregate requires that if the largest desired size be 3 in., from 40 to 75 per cent must pass a 1½-in. ring, 15 per cent through a No. 4 sieve and not more than 5 per cent should pass a No. 8 sieve. A separate analysis is provided for each maximum size.

This subject was brought before the committee so that recommendations of changes, if any, could be suggested for Mr. Sutton to act upon at the next meeting of the A. S. T. M. It was voted that the association defray part of the expense of Mr. Sutton's trip to the next meeting.

The financial report as read by Mr. Prince shows the association to be in a flourishing condition. There are no creditors and the bank balance and accounts receivable is well up in five figures.

The membership now stands at 130—an increase of 26.2 per cent since March 10, 1922. This number includes only paid-up members.

Discussions also covered the subjects of car demurrage, how to increase membership, and an educational program. The only member not present was G. C. Ross of Parkersburg, W. Va. A telegram from him explained that due to the sinking of one of his company's diggers it was impossible for him to be present.

Program of the National Lime Association Convention

THE fifth annual convention of the National Lime Association, to be held at the Hotel Commodore, New York City, June 13, 14 and 15 will have the following program. The sessions will be held in the West Ball Room.

"During the last year," announces General Manager W. R. Phillips, "there have been developments in the lime industry of a character and nature that make it necessary for them first to be discussed with association members only, and since the convention is based almost entirely on these developments, it will be almost exclusively an executive session, there being not more than a couple of hours during the three-day session when it will be good business policy to permit outsiders in the meeting.

"We appreciate the value of having, under ordinary circumstances, publicity given to our national convention, but, on the other hand, we do not wish to be embarrassed by bringing men to the convention and then being forced to exclude them from most all of the sessions."

PROGRAM OF THE NATIONAL LIME ASSOCIATION

(All Schedules on Daylight Saving Time)

Wednesday, June 13

A. M.

11:00—Meeting of Board of Directors.

P. M.

1:00—Luncheon.

Executive Session (Open to Qualified Members of N. L. A. Only).

2:00—Opening Address: Charles Warner, President National Lime Association.

2:30—Executive Report of General Manager W. R. Phillips, General Manager, National Lime Association.

3:00—Informal Discussion (Open to All Members): The entire afternoon session is to be devoted to presenting to the membership a full report of the business condition and problems of the association, and to informal exchange of views by all members regarding future association policies. No formal action on any matters will be taken at this meeting, such action being reserved for executive session on Friday.

Thursday, June 14—Open Session

A. M.

10:00—Opening Address: Charles Warner, President, National Lime Association.

10:15—Report of General Manager W. R. Phillips, General Manager, National Lime Association.

Section 1—General Reports of Departments

10:30—Report of Soil Technologist: J. A. Slipher, Soil Technologist, National Lime Association.

10:45—Report of Construction Department: R. P. Brown, Construction Engineer, National Lime Association.

11:00—Report of Highways Department: W. A. Freret, Special Representative, National Lime Association.

11:15—Report of Chemical Director: M. E. Holmes, Chemical Director, National Lime Association.

Section 2—Manufacturing Subjects

11:30—Late Developments in Quarrying: Oliver J. Bowles, Mineral Technologist, U. S. Bureau of Mines.

11:45—Efficiency of Lime Burning: Victor J. Azbe, Combustion Engineer.

P. M.

1:00—Luncheon.

(All discussions and demonstrations on the following papers confined to executive session after all papers have been presented.)

Section 3—Lime in Highways

2:00—A. Sub-Bases.

B. Asphalt: W. A. Freret, Special Representative, National Lime Association; M. E. Holmes, Chemical Director, National Lime Association.

Section 4—The Lime Partition Block

2:30—Development and Manufacture: W. A. Freret, Special Representative, National Lime Association; W. E. Emley, Chief Lime Section, U. S. Bureau of Standards.

Section 5—Quicksetting Lime Plaster

3:00—Outline of the Work of the Association on a Quicksetting Lime: M. E. Holmes, Chemical Director, National Lime Association.

3:15—Compounds of Lime, Water, and Carbon Dioxide: R. T. Haslam, Director, Laboratory of Applied Research, Massachusets Institute of Technology.

3:30—Carbonated Hydrated Lime as a Basis for Quicksetting Lime Plaster: F. C. Mathers, Professor of Inorganic Chemistry, Indiana University.

3:45—Effect of Burning Conditions on Time of Set of Lime Plaster: James R. Withrow, Professor of Industrial Chemistry, Ohio State University.

4:00—Summary of Association Investigations in Development of Quicksetting Lime Plasters: G. J. Fink, Research Chemist, National Lime Association.

Section 6—Executive Session. (Open to Qualified Members of N. L. A. Only)

4:15—Discussion of Foregoing Papers. (Open discussion.)

4:30—Plant Problems in Connection With the Manufacture of Quicksetting Plaster. (Open discussion.)

5:00—Manufacturing Problems in Connection With the Lime Partition Block. (Open discussion.)

7:00—The Association Will be the Guests of the Valve Bag Co. of America.

Friday, June 15, 1923

Executive Session. (Open to Qualified Members of N. L. A. Only)

A. M.

10:00—Election of Officers.

(Balance of program for this session will be presented during the meeting.)

Moroccan Phosphate Exports

THE register of the customs collector at Casablanca states *Commerce Reports*, shows exports of phosphatic rock from Morrocco during the year 1922 amounting to 80,549 tons, distributed as follows: France, 25,454 tons; Spain, 22,625 tons; Portugal, 2640 tons; Belgium, 3225 tons; Netherlands, 14,910 tons; Italy, 750 tons; England, 8170 tons; Switzerland, 525 tons; Sweden, 2250 tons.

The American consulate has been informed by local agents of navigation companies that offerings of phosphatic rock or similar material in bulk shipments to Marseille or Bordeaux will be accepted at the rate of 25 francs per ton, and to Antwerp at the rate of 30 francs per ton for large cargoes. Shipments of phosphatic rock to Bordeaux have actually been accepted by one company, in cargoes of 10,000 tons, at the rate of 22 francs per ton.

Co-operation Aiding Slate Campaign

AT the Cleveland Building Show, the Auld and Conger Co., in co-operation with Mr. Gunderson, a roofing contractor, saw that a slate roof was put on the model electric home. For the model home of the Philadelphia Palace of Progress, May 14 to 21, the William Moore and the E. P. Henry companies are putting in slate walks, etc., the National School Slate Co., kitchen slates; Philadelphia members of the association are putting in a special booth, "Slate —Consider Its Uses." Several roofers are ready to co-operate if any roofing exhibits are needed.

Contractors and dealers from all over the country, sensing the aroused interest of the public for slate, are writing in, anxious to help and cash in on the slate sales growing out of such interest.

John Rice Returns from His Round-the-World Trip

JOHN Rice, president of the General Crushed Stone Co., of Easton, Pa., has returned from his six months' trip around the world.

On Mr. Rice's return to Easton he wrote to ROCK PRODUCTS that he deeply regretted his inability to acknowledge his great appreciation of the cable message sent him by the National Crushed Stone Association while it was in executive session in Chicago last January. He was absent from the boat when it arrived, and did not get it until too late to reach the association while it was still in session. He was very sorry to have missed the convention this year.

Western's New Lime Plant Progressing

PRACTICALLY all of the foundations have been poured and the 500-ft. dock is nearing completion for the Western Lime and Cement Co.'s new lime plant at Green Bay, Wis. All the necessary materials are at hand and it is expected that the plant will be producing by July 1.

This plant is being built entirely of steel, concrete and brick. The plans call for a five-kiln plant, but only three are being put up at the beginning so that production can be started as soon as possible. The work, however, will continue upon completion of the first three kilns.

A feature of the operation is that there will be no quarry, as a high-calcium limestone is to be shipped in from a Michigan port; coal will be used for fuel. This will be the company's first experience in burning lime other than with wood. As the property on which the plant is being erected is in Green Bay's manufacturing district, no difficulty was had in obtaining a city building permit. It was expected that objection would be raised on account of the smoke and soot it would give off.

The general design and layout of the operation was drawn up in the rough by the company and the detailed drawings were made by Arnold & Weigel, contractors and engineers, Woodville, Ohio. When completed, the battery will comprise five 12x40-ft., outside measurement, steel shaft kilns. The walls of the buildings will be of brick and the lime shed and firing floors of concrete. Harvey S. Owens is the company's engineer in charge of the construction.

A "Rock Products" Experiment Station of the U. S. Bureau of Mines

THE Secretary of the Interior on May 11 designated Rutgers College, New Brunswick, N. J., as the location of a new mining experiment station of the Bureau of Mines, which will specialize in problems involved in the production and utilization of the non-metallic minerals. These minerals include bauxite, cement, clay, feldspar, fuller's earth, graphite, gypsum, lime, mica, phosphate rock, salt, sand and gravel, sand-lime brick, slate, stone, sulphur, mineral paints, garnet, asbestos, and talc. The value of these non-metallic minerals produced annually in the United States is in the neighborhood of a billion dollars.

The choice of Rutgers College was determined largely by the fact that its location is central with reference both to the production and consumption of non-metallic minerals. Pennsylvania alone has 1 7/10 times as great a production of non-metallic minerals as all the states south of the Potomac and Ohio rivers combined.

The New England and North Atlantic states, which are readily served from New Brunswick with a minimum of travel, have a combined non-metallic output of approximately 3½ times that of all the states south of the Potomac and Ohio rivers. Furthermore, about 75 per cent of the industries consuming the non-metallic minerals production center in the large industrial cities and are within easy reach of Rutgers College.

Ladoo Resigns from Bureau of Mines to Enter Business

IT was announced that Raymond B. Ladoo, mineral technologist of the United States Bureau of Mines and widely known for his work in the field and his contributions to technical literature, has resigned from the bureau and accepted a position as general manager of the newly formed Southern Minerals Corp., incorporated under the laws of Vermont.

The officers of the new company are: president, J. S. Patrick, Burlington, Vt.; vice-president, J. T. Smith, Waterbury, Vt.; treasurer, R. L. Patrick, Burlington, Vt. At the present time Mr. Smith is vice-president and general manager of the Magnesia Talc Co. of Waterbury, Vt. The officers and principal stockholders of the new company are practically the same as those of the Magnesia Talc Co.

Mr. Ladoo has opened an office in Washington at 901 Continental Trust building, Fourteenth and H streets. Undoubtedly his many friends in the rock products industry join ROCK PRODUCTS in wishing him the best of success in his new undertaking.

Rates on Indiana Agricultural Limestone to Drop 25 Per Cent

INDIANA intrastate freight rates on agricultural limestone will drop an average of about 25 per cent as soon as the railroads publish the new tariffs, John McCardle, chairman of the Public Service Commission, has announced.

Mr. McCardle made the announcement at the end of a conference between Leo P. Day, an attorney for the New York Central, and other railroad representatives, with O. P. Gothlin, the commission's freight rate expert. The new rates will come, Mr. McCardle said, as the result of an agreement proposed by the railroads to settle a case Mr. Gothlin was pressing against them on behalf of the Indiana State Farm, which produces a great deal of limestone.

J. S. Vrabek Forms Engineering Partnership with H. H. Kessler

AN engineering partnership has been formed by J. S. Vrabek, sales manager for years with the Sturtevant Mill Co., and H. H. Kessler, a Cornell graduate, formerly with the Atlas Portland Cement Co. and later with the Hardinge Conical Mill Co.

Mr. Vrabek for seven years was western sales manager of the Sturtevant Mill Co. at Chicago and has many friends throughout the West. He is a graduate of the Allis-Chalmers Manufacturing Co. sales and engineering staff, which has trained so many prominent men in the rock-products industries.

Aside from general engineering, consultation and appraisal work the new firm will represent machinery and equipment manufacturers in the East.

To Sell Universal Cement by the Bag

BEGINNING June 1, the Universal Portland Cement Co. will sell and invoice its cement by the sack instead of by the barrel. This change, the company announces, is made only after sending an inquiry to thousands of cement buyers, including dealers, contractors, architects and engineers, large industrial concerns and others. The replies were overwhelmingly in favor of the change.

Questions and Answers

Edmund Shaw, Consulting Engineer, Chicago, Ill., Expert on Problems of Screening, Washing and Hydraulic Separation

THE TECHNICAL STAFF OF ROCK PRODUCTS

Edwin Brooker, Washington, D. C., Consulting Expert on Matters of Transportation and Freight Rates

Gordon Smith, First National Bank Bldg., Chicago, Ill., Expert on Crushing and Cement-Plant Problems

A Work on Cost Accounting.—Since the issue of May 5 containing an inquiry from R. E. L. asking for the names of publishers of books on cost accounting for rock or limestone quarries, we have received the following communication from W. S. C.: "We note Question No. 57 in the May 5 issue of ROCK PRODUCTS regarding cost accounting. We have a book entitled 'Corporation Accounting,' by R. J. Bennett, C. P. A., the Ronalds Press Co., New York City. We have found this book so broad in its scope that it is very helpful to us in working out a cost system and records."

No. 58. **What Is Feldspar, Its Varieties and How Is It Marketed?**—Please give me some information as to feldspar, how many varieties there are and what steps are taken to put it on the market.—E. M. J.

A. Feldspar comes from a mineral group consisting of a large number of members. It is an aluminum silicate of the alkalies and alkaline earths. In nature they rarely occur in the pure state. They may be classified into four distinct groups: 1. Potash feldspars, known as microcline or orthoclase; 2, soda feldspar, known as albite; 3, lime feldspar, as anorthite; barium feldspar, as celsian. In nature these minerals commonly occur as intimately crystallized masses of two or more different feldspars. Some of the feldspars apparently combine and form homogeneous crystals of definite composition, whereas others are isomorphous mixtures. In nature there is very rarely to be found a pure feldspar—that is, containing but one alkali—in large quantity, and feldspars consisting of mixtures of but two pure minerals are comparatively rare. The manufacturer has little use for data based on the pure minerals except as they conduce to a better understanding of the complex feldspars with which he has to deal. Two forms of potash-feldspars, microcline and orthoclase, are most extensively used in the industries. The chemical compositions and physical properties of these two minerals are identical. The alkali feldspars are the only ones having industrial importance at present. The potash feldspars are used in largest quantities; they constitute the chief flux of all ceramic or clay bodies, causing a gradual vitrification which can be controlled in commercial kilns. The soda feldspars are used chiefly as an auxiliary flux with the potash feldspars, but predominate as a glaze flux over the potash feldspar, as they impart to the surface produced a superior gloss and texture. Feldspar was marketed in the ground state exclusively until within the past five years, when a few large manufacturers installed grinding machinery and are now buying the crude rocks. Feldspar is mined in Maine, New Hampshire, Connecticut, New York, Pennsylvania, Maryland, and in North Carolina. It is mined by ordinary quarry methods, and after a general sorting the rejected portion is resorted, and by cobbing an additional yield of table rock is obtained. The crude rock is crushed in a jaw crusher or under a buhrstone chaser mill and screened, the fines going to the pulverizing mill and the coarse returning for further crushing. The pulverizing process is accomplished in either the ball, the tube or the conical mill. In the United States all grinding is done dry, but in Europe, where the plants grind their own feldspar, the wet process is general. The market is confined to such areas as New York, New Jersey, West Virginia, Ohio, and Indiana, with Trenton, N. J., and East Liverpool and Zanesville, Ohio, as the principal centers; not more than 10 per cent is marketed outside these areas. The market has never been oversupplied for more than a few months during the past 20 years. Feldspar is shipped in bulk in carload lots, purchasers now demanding that the cars be lined with paper; less than carload lots care shipped in cloth sacks, all prices being f.o.b. cars at mill. No base for determining the value of feldspar has been established. At present a feldspar with 10 per cent potash or soda has the same value as one containing 12 per cent. No doubt some radical change will be made in the next year or two.—J. M. H.

No. 59. **Bank-Run Gravel.**—Will you please give me the official classifications for what is termed bank-run gravel? We have them for the 2-in. and the ¾-in. In your issue of May 5, on page 57, you make mention of this gravel. Please let me know whether this gravel is washed; what size it should be; how much sand would be allowed—in fact, the official classifications.—W. M.

A. My understanding of the classification "bank-run gravel" is the sand and gravel just as it comes from the bank, unscreened and unwashed. The size is immaterial and would vary with the particular bank from which it is taken. It would be pretty difficult to define in it any other way. Of course, for concrete work, boulders more than 2 or 2½ in. would ordinarily be removed, but for railroad ballast, road filling, etc., the boulders might still be in the material. Ordinarily, bank-run gravel would contain all the sand that the original deposit contained, but of course where the demand was for the stone only, it might be screened. In an engineering sense, bank-run gravel is synonymous with "crusher-run stone" and refers to a gravel containing an assorted mixture of sizes.—N. C. R.

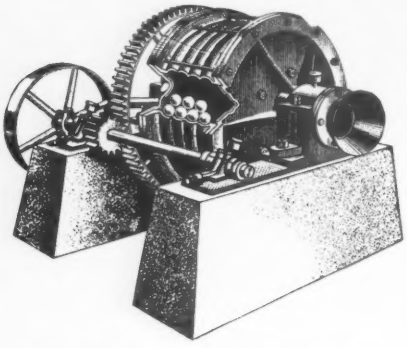
No. 60. **Bauxite, and Where It Occurs.**—Please inform me as to what bauxite is, where it is found, and what is its purpose commercially.—P. J. M.

A. Bauxite is the ore of aluminum, the crude material for the manufacture of artificial aluminum abrasives—such as alundum, the chief crude material for the manufacture of aluminum salts, such as alum, aluminum chloride, and aluminum sulphate, and is used to some extent in the manufacture of aluminum refractories which are sold as bauxite brick or high-alumina brick. Since more bauxite as mined contains much water, the usual practice is to dry it before shipment, thus cutting the freight cost. A small quantity of the domestic is shipped without drying, and some is calcined at high temperature before shipment. According to the United States Geological Survey, Arkansas has always produced the great bulk of bauxite mined in this country. Deposits which normally yield 10 per cent of our supply are situated in northeast Alabama, northwest and central Georgia, and southeast Tennessee—in the Eastern field. France has been the second largest producing country in the world, though it is quite probable that in the near future British Guiana and Dalmatia may supply more than France. The United States is the largest consumer in the world; France ranks second; Germany third, England fourth, and there is a small consumption in Italy. The chief consumer is the aluminum industry, second is the aluminum salts industry, and third is the aluminum abrasives. A small quantity is consumed in the manufacture of refractories. In the United States the chief consuming centers are East St. Louis and Joliet and vicinity in Illinois; Cincinnati and Columbus in Ohio; Pittsburgh and Philadelphia in Pennsylvania; Niagara Falls and New York City and vicinity in New York, and Boston and vicinity in Massachusetts. At the large mines the bauxite is crushed to ½ to 1-in. mesh and put through rotary driers much like small cement furnaces, though the temperatures used are lower. Persons entering the bauxite production business should know clearly, by adequate sampling of their deposits, the character of their bauxite. The analysis should indicate what industry should be approached.—J. M. H.

Hints and Helps for Superintendents

A Suggested Improvement in Ball-Mill Liners

THE ball-mill has been extremely popular, owing to its simplicity and large capacity, writes E. Hedburg in *Engineering and Mining Journal-Press*, but it is by no means an economical ore grinder as ordinarily used; it uses up the balls and liners too quickly. The cost per ton milled is higher than it should be; in several instances this cost runs up to 50 cents per ton. One cause is that the balls, working against a smooth liner, present at best only a point



A ball mill with a circular-ribbed liner

contact. Rods have been tried out in place of balls, as they present a line contact against the mill liners, but they lack flexibility.

In the illustration is shown a new ball-mill lining, made with grooves for the balls to work in; it gives much greater contact than do flat liners. The mill, as here illustrated, was first adopted for crushing free-milling gold ores at a prospect, but may be serviceable in large plants as a regrinder, or to take the place of a tube mill. The grooved liners may be made to fit inside any size of ball mill, and will cost no more than any standard mill lining.

Strips on Conveyors

OF all materials, gravel is no doubt the most awkward to convey on a belt having a great inclination, and this is especially so if the belt operates with much slack. Gravel can be deposited on a belt and it will stay put only until it passes over the first idler. There it is disturbed and usually a considerable amount is spilled.

The practice is quite common to bolt strips of belting on conveyors handling gravel; but there is a good and a bad way of doing all things. In the Knoxville Sangravl Material Co.'s plant, Knoxville, Tenn., may be seen a good way of applying strips to an inclined conveyor. The illustration shows this company's system. Instead of bolting strips flat to the belt they are bolted

By allowing the strips to double up between the bolts, more resistance is given to the back-rolling material

with three bolts and allowed to double, or pucker up between the bolts. This offers greater resistance to the rolling material.

Passenger Car in Quarry

THE Louisville Cement Co.'s cement and "Brixment" plants at Speed, Ind., are more than a mile from the quarry. Most of the houses in which the quarrymen live are located from a quarter to half a mile on the opposite side of the plants from the quarry so that it would require at least 30 minutes for the men to walk from their homes to the quarry.

It wasn't because the company believed that walking such a distance morning and night would be detrimental to its employes' health that it had constructed a means of conveyance for them. It was because officials recognized that if the men could ride rather than walk to work, they would be much more efficient and could give to the company, in the form of work, that energy which they would expel in walking.

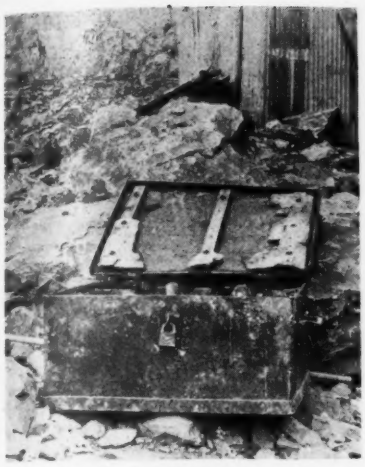
The conveyance provided was a specially constructed flat car with sides and roof, and seats on either side, extending the full length. The car has the appearance of an ordinary railway box car with the exception of two windows on either side and one at each end. It is of narrow gage and was built of two sets of dump-car trucks spaced approximately 16 ft. apart. The car is heavily floored so that equipment can be hauled. A special feature is a door 16 in. square, the bottom of which is at the floor level, and fitted at each end. This provides for loading long drill steel to be taken to the shop at the cement plant. The doors in the ends also permit the loading of rails, pipe, or any other such equipment.

The men are hauled not only at morning and night but also at the noon hour. This gives them an advantage over the average limestone quarrymen in that they can have a hot meal rather than the usual bucket lunch.

There are seats on either side and at the ends of this car so that 30 to 40 men can be carried at a time. The arrow points to the door through which drill steel, pipe and rails may be placed aboard

Metal Dynamite Box

MEN who have charge of the secondary blasting at nine quarries out of ten provide themselves with an empty, wooden, open top dynamite box in which they carry sticks of dynamite, caps and fuse from pop-hole to pop-hole. Few of them realize the danger they are exposing themselves to by



Metal boxes like this one for carrying dynamite about the quarry are much safer than regular wooden dynamite boxes. It has individual compartments for the dynamite, caps and fuse

carrying caps and dynamite together.

Not only in making this practice do the men endanger themselves but they also involve others. For instance, while pursuing other tasks, they go away and leave the box exposed, thereby offering the possibility of flying stones or sparks from the shovels or locomotives hitting or getting into the box; also the possibility of someone gaining access to the box who has no business there.

In the quarries at the Dixie Portland Cement Co.'s operation at Richard City, Tenn., these possibilities are greatly reduced by the use of specially constructed boxes of armor plate, as shown in the illustration. The boxes are provided with a handle on either end, a cover and a hasp and padlock. Each box is divided into three compartments —one each for dynamite, for caps and for fuse. This is only one of the company's safety-first measures which go to prove that it takes less time to prevent an accident than it does to report one.

Simple Method of Feeding a Conveyor

AMONG other things that go to make up an economical operation at the Bond Sandstone Brick Co.'s plant at Lake Helen, Fla., is a little kink which is embodied in the conveying of the raw material from the pit to the plant.

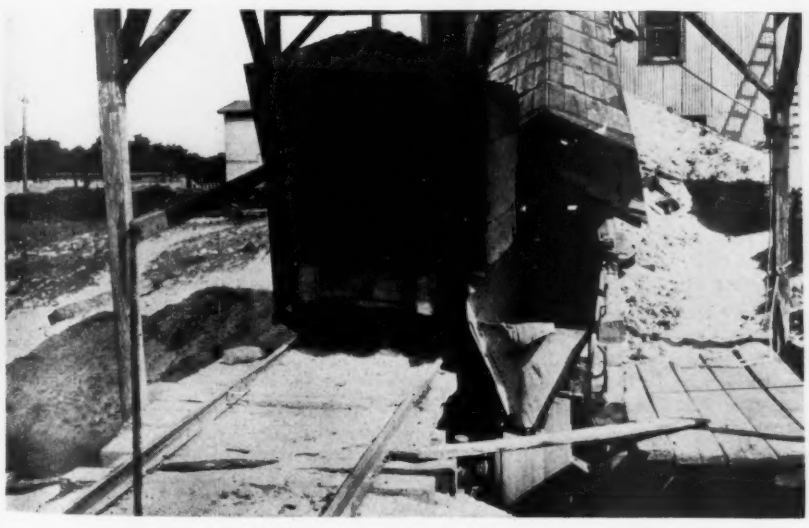
This is a V-shape galvanized-iron trough, approximately 16 in. wide at the top and 4 ft. long, with a 4-in. opening at the bottom. It is mounted over a 14-in. belt conveyor leading from the pit floor level to the plant.

The illustration shows its purpose. The cars, which are of 1½ yd. capacity, have inclined bottoms with side opening doors, hinged at the top, so that when the door is opened the material flows by gravity into the trough.

THESE "Hints and Helps" were obtained by a "Rock Products" editor in the field. But the editors also welcome any such articles from readers and will gladly pay for them. Why not send in a description of that kink in YOUR plant? Send it in the rough—also a pencil sketch or photo. We'll do the rest.

The trough, of course, is securely held by means of two ½x2-in. flat iron braces on either side and it is big enough to hold a carload of sand at a time. As the trough has only a 4-in. opening at the bottom, the amount of material fed to the belt is uniform.

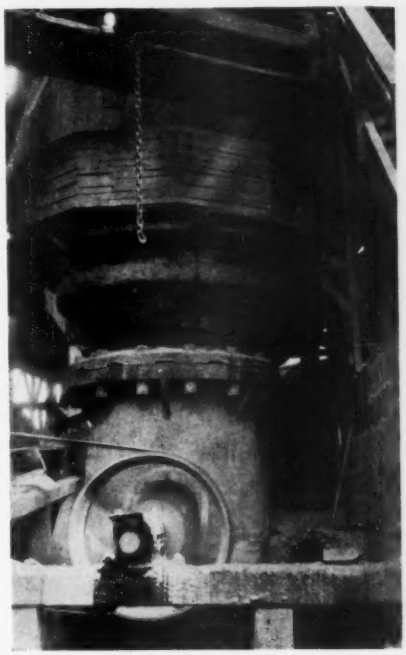
This arrangement has existed at this plant for several years and has proven satisfactory. It relieves the operation of an extra man and insures a continuous feed to the plant. The company's superintendent, Mr. Roberts, is responsible for the idea.



The trough has a 4-in. opening on the bottom and accommodates a carload of sand at a time insuring a uniform feed to the plant

Sturdy Framework Around Crusher Hopper

IT IS unusual when a gyratory crusher is so located that it is impossible to build a floor around it on a level with its hopper. However, such is the case in the plant of the Ladd Lime and Stone Co., at Cartersville, Ga., with reference to one of the secondary crushers, a No. 7½.



This octagonal hopper is 2 ft. high and held in place by its own weight

Due to the fact that this crusher was installed after the plant was built and that it was not included in the original design, the construction of the plant was such that a floor could not be conveniently laid. It was therefore necessary to build a framework, or hopper, about the crusher so that in case of a choke-up, the stone would not overflow the crusher hopper; also, to stop flying stones coming from the chute feeding the crusher.

The type of hopper provided for this crusher is illustrated herewith. The hopper is octagonal shaped and is made up of 2x6-in. boards, placed one on top of the other. Each side is 30 in. wide and is built up to 24 in. in height. The frame is held in place by its own weight and the operators say that it serves the purpose well. A walkaway was built along one side of the crusher, so that a man can have access to the hopper in the event of a choke-up.

Traffic and Transportation

By EDWIN BROOKER
Munsey Building, Washington, D. C.

Proposed Increases Not Allowed

THE St. Louis & San Francisco railroad recently published increased rates on sand and gravel from Grinter, Muncie, and Turner, Kans., to destinations on the Frisco in Missouri, Kansas, Oklahoma, and Arkansas. Such rates were published in Supplement 10 to Frisco Tariff I. C. C. No. 7812, to become effective December 31, 1922. The new rates were on a basis of 1 cent per 100 lb. in excess of the Kansas City rates in lieu of the Kansas City basis, which has been in effect for some time.

The Muncie Sand Co., the Stewart Sand Co., and the Kaw River Sand and Material Co., owning the plants at the aforesaid points, asked for a suspension of the proposed increased rates which was granted by the Interstate Commerce Commission.

At the hearing before the examiner it was pointed out that the new rates would place the affected companies on a basis of 1 cent per 100 lb. over their competitors located within the switching limits of Kansas City proper. It was shown that the cost of producing the sand from the river ranged from 55 to 60 cents per ton and that the material sold for prices ranging from 66.2 to 68 cents per ton. The average profit being between 9 and 10 cents per ton. The proposed difference of 1 cent per 100 lb. or 20 cents per ton would in normal times eliminate producers at Turner, Muncie, and Grinter from competition with the plants in Kansas City, at markets on the Frisco, according to the testimony offered.

The commission found that on account of the competition existing and the fact that the transportation conditions were similar from all the points in question, warranted the application of the same basis from Muncie, Grinter, and Turner, Kans., as in effect from plants at Kansas City and ordered the proposed increased rates cancelled.

Recommends That Ohio Sand and Gravel Rates Be Raised

EXAMINER C. M. BARDWELL, in a tentative report on Docket No. 14252, has recommended that Ohio rates on sand, gravel and crushed stone be increased to a basis of 115 per cent of the rates in effect prior to the 40 per cent increase of August 26, 1920.

The Public Utilities Commission of Ohio, by order during 1921, removed the 40 per cent increase on these materials between points in Ohio and such rates were established by the railroads during the latter part of that year. The railroads affected have made a strenuous fight against this order, appealing to the Supreme Court of Ohio, which upheld the Ohio Commission in its decision. The railroads then filed a petition with the Interstate Commerce Commission on the grounds that such lower rates in Ohio violated the provisions of Sections 13 and 15A as well as the principles enunciated in the Shreveport case.

The examiner in the tentative report upholds the claims of the railroads in regard to Sections 13 and 15A, but says that the evidence relating to undue prejudice as between persons and localities in intrastate commerce on the one hand and interstate commerce on the other was conflicting and inconclusive.

Producers of Ohio and the state commission will now have the opportunity of filing exceptions to the proposed recommendation of the examiner, after which there will be an oral argument before the commission thereon. A decision in the case will probably not be given until fall.

The tentative report of the examiner is another demonstration of the determined attitude of the I. C. C. not to let the state commissions disturb their rulings and orders on rates as a whole, in which the question of earnings on basis of valuation of the properties is made an issue. In cases of this kind, the question of what is a reasonable basis is never considered. Supposedly, the rates in the Central States on all commodities are lower than exist in any other part of the United States, which is on account of the fact that traffic density is responsible for lower operating costs. On sand, gravel and crushed stone, however, we find the highest rates in the country in the Central States.

The chief cause for this is due to the fact that the rates on these materials in the Central States are not on a uniform basis. We find high rates and low rates and any general movement seeking a general reduction in both high and low rates seems to be doomed to failure.

The solution of the entire question seems to lie in a movement for some uniform, maximum level of rates which, if supported by a sufficient number of producers, will result in material reductions in rates on sand, gravel and crushed stone in the Central States. The I. C. C. has issued orders in other territories establishing a maximum basis which applies in a territory where the rates should be materially higher than in the Central States, but even if the basis referred to was established in the Central States, it would result in reductions in the majority of the rates. This, without taking into consideration the fact that the Central states are entitled to a lower basis on account of traffic density.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning May 14:

Central Freight Association

6371. Gravel and Sand (except blast, engine, foundry, loam, marl, molding and silica), Winona Lake, Ind., to Warsaw, Ind., present 69 cents per net ton; proposed, 50 cents.

6375. Crushed Stone, St. Paul, Ind., to Speedway, Carter, Indian Girls' School and Clermont, Ind., present, 92 cents per net ton; proposed, 86 cents.

6378. Crushed Stone, Piqua, Ohio, to Ohio. Rates, per net ton:

To	Present	Proposed
Versailles	$0.70	$0.80
Russia	.90	.80
Houston	.90	.80
Dawson	.90	.80
Hardin	.90	.80
Pemberton	.90	.80
DeGraff	1.26	.80
Mechanicsburg	1.00	.90
London	1.00	.90

6406. Furnace Slag, Ashes, Refuse and Cinders (except mill cinder and pyrites ore cinder), New Castle and Sharpsville, Pa., to Pulaski, Pa. Present (from Sharpsville, Pa.), slag, 45 cents; ashes, 63 cents; cinders, 63 cents; refuse, 6th class. From New Castle, Pa., slag, 45 cents; ashes, 50 cents; cinders, 50 cents; refuse, 6th class. Proposed, 45 cents per net ton.

6422. Lime, Gibsonburg, Woodville, Maple Grove, Bettsville and Luckey, Ohio, to Lawrenceburg, Ind., present 17 cents; proposed 14 cents.

6433. Sand and Gravel, Lafayette, Ind., to C. A. & S.:

To	Present	Proposed
LaCrosse	$0.13½	$1.00
Wilders	.13½	1.00
Burkes	.13½	1.00
Dunns	.13½	1.00
Wheatfield	.13½	1.00
Zadoc	.13½	1.00
Kniman	.13½	1.00
Virgie	.13½	1.00
Fair Oaks	.13½	1.00
Kents	.13½	1.00
Mt. Ayr	.13½	1.00
Julian	.13½	1.00
Foresman	.13½	1.00
Percy Junction	.12	.80
Weishaars	.13	.80
Brook	.13	.80
Beaver City	.13	.80
C. & E. I. Crossing	.13	.80
Pogue	.14	.80
Elmer	.14	.80
C. & E. I. Crossing	.14	.80
Goodland	.11½	.80
Wadena	.11½	.80
Lochiel	.11½	.80
Barce	.11½	.80
Swanington	.10	.80
Pine Village	.10	.80
Chatterton	.10	.80
Winthrop	.10	.80
Kickapoo	.10	.80
Glen Cliff	.10	.80
Attica	.10	.80
Rob Roy	.11½	1.00
Aylesworth	.11½	1.00
Stone Bluff	.11½	1.00
Veedersburg	.11½	1.00

Yeddo	.13	1.00
Kingman	.13	1.00
Tangier	.13	1.00
West Union	.13½	1.00
West Melcher	.13½	1.00

6435. Sand and Gravel, Terre Haute, Ind., to Shattus, Ferrin, Huey, Carlyle, Becremeyer, Breese, Ill., Aviston and Trenton, Ill., present, 6th class; proposed, $1.26.

6436. Crushed Stone and Stone Screenings, Greencastle, Ind., to Owensville, Mounts, Knowles, Cynthia and Poseyville, Ind., present, $1.26 per net ton; proposed $1.13.

6438. Crushed Stone, New Paris, Ohio, to Sexton, Ind., present, 13 cents per net ton; proposed, 92 cents.

6445. Lime, Afton, Mich., to Sault Ste. Marie and Newberry, Mich., present, 12½ cents; proposed, 10 and 12 cents respectively.

6450. Ashes, Cinders and Slag, Bellaire, to Pleasant City and Ava, Ohio, present, 13½ and 14½ cents; proposed, $1 per net ton.

6455. Gravel and Sand (except glass, molding, silica, loam, etc.), Wolcottville, Ind., to White Pigeon, Mich., Bristol, Elkhart and Millersburg, Ind., present, 92 cents to White Pigeon and Millersburg and $1.01 to Bristol and Elkhart, Ind.; proposed, 82 cents.

6459. Sand and Gravel, Miami Grove, Ohio, to Pleasant Ridge, Kennedy Heights, Silverton and Deer Park, Ohio, present, 10½ cents; proposed, 80 cents to all points except Deer Park, 90 cents per net ton.

New England Freight Association

4586. To cancel rates of 50 and 60 cents per net ton on Crushed Stone, from Westfield, Mass. (for beyond on N. Y. N. H. & H) as per B. & A. I. C. C. 8683, applying switching rate 38 cents per net ton as per B. & A. I. C. C. 8671. Reason: To restore rate to original basis.

4608. Lime, minimum weight 40,000 lb., from Lime Ridge, P. Q., to Beecher Falls, Vt., West Stewartson and Colebrook, N. H., 10½ cents; North Stratford, N. H., 11 cents; Lancaster, N. H., 12 cents; Whitefield, N. H., and Gilman, Vt., 12½ cents. Reason: To make rates comparable with rates in effect for like distances from Rockland, Me.

4632. Lime and Lime Ashes, minimum weight 40,000 lb., Fonda Junction, Highgate Springs, Swanton and Winooski, Vt., to points on the N. Y. C. between Albany and Oriskany, N. Y., inclusive, 20½ cents. Reason: These rates are necessary on account of no through rates in effect and rates compare with rates in New England today.

Illinois Freight Association

1813. Sand and Gravel Pit and Stone Quarry Strippings, to amend rule 424 of W. T. L. Circular 1P, to eliminate exception applicable on Illinois intrastate traffic.

726A. Crushed Stone, C. L., minimum weight, marked capacity of car, $1.40 per net ton, from Thornton, Ill., to Clay City, Noble, Higgins, Olney, Claremont and Sumner (Law Co.), Ill., via C. & E. I. and B. & O. (406-4-10).

1825. Crushed Stone, C. L., minimum weight capacity of car, 50 cents per net ton from Thornton, Ill. to deliveries on C. W. P. & S.

322C. Plaster, Wall Plaster and Stucco, in straight carloads, also roofing pitch, in mixed carloads, with commodities named, uniform minimum weight of 30,000 lb., in connection with commodity rates between points in I. R. C. territory.

1843. Limestone, C. L., minimum weight, 30,000 lb., $2.05 per net ton from Mosher and Ste. Genevieve, Mo., to Keokuk, Iowa, routed via Mo., Ill., Centralia, I. C., Decatur, Ill., and Wabash Ry.

1848. Crushed Stone, C. L., minimum weight 90 per cent of marked capacity of car, 88 cents per net ton, from Buffalo and Linwood, Iowa, to Taylor Ridge, Ill. (M. R. P. 1937).

Southern Freight Association

9808. Stone, viz., Crushed, Rubble or Granite Sand, C. L., minimum weight 60,000 lb., from Conyers, Lithonia, Redan and Stone Mountain, Ga., to Mobile, Ala., and New Orleans, La., present rate, $2.82; proposed rate, $2.50 per net ton.

9882. Limestone, ground or pulverized, C. L., minimum weight 60,000 lb., from Cedar Bluff, Ky., to points on the L. & N and N. C. & St. L. in Kentucky. No through rates at present in effect; combination rates apply. It is proposed to establish rates on basis of mileage scale, proposed rates to representative points being:

To N. C. & St. L.—Oaks, Ky., $1.21; Elva, Ky., $1.32; Iola, Ky., $1.32; Benton, Ky., $1.43; Glade, Ky., $1.43; Hardin, Ky., $1.43; Dexter, Ky., $1.43; Alma, Ky., $1.43; Murray, Ky., $1.43; Hazel, Ky., $1.55.

To L. & N.—Mannington, Ky., $1.27; Crofton, Ky., $1.37; West Fort, Ky., $1.47; Guthrie, Ky., $1.57; Olmstead, Ky., $1.57; Russellville, Ky., $1.58; Auburn, Ky., $1.68; Rockfield, Ky., $1.68.

9887. Rubble Stone between stations on the Southern and associated lines in Alabama, Florida, Georgia, Mississippi, North and South Carolina, Tennessee and Virginia. It is proposed to establish rates on rubble stone, C. L., between the stations named, same as in effect on stone, crushed or stone screenings, as published in Southern I. C. C. A9490.

9888. Cement, C. L., from Leeds, Spocari, Ala., and Richard City, Tenn., to Deerland, Mina and Morris Siding, Ga., present rate from Leeds and Richard City, 12½ cents; proposed rate, 10½ cents per 100 lb. Present rate from Spocari, 15 cents; proposed rate, 12½ cents per 100 lb. Proposed rates same as in effect to Atlanta, Ga.

9894. Sand, C. L., minimum weight 90 per cent of the marked capacity of car except when cars are loaded to their visible capacity, in which case the actual weight will apply, from Lexington, Miss., to Dyersburg, Tenn., present rate, $2.10 per net ton; proposed rate, $1.80.

9903. Carload minimum weight in connection with rate on slag C. L., from Copperhill, Tenn., to Southeastern points. It is proposed to revise the minimum weight from capacity of car to 90 per cent of marked capacity.

9919. Lime, C. L., from Nashville, Tenn., to Johnson City and Morristown, Tenn., present 6th class rates only; proposed rate, 46 cents per 100 lb.

9923. Rates on Lime, in paper bags, packed in cartons, L. C. L., from points on the Southern in Virginia to Southern and Carolina points, including points in Virginia. It is proposed to amend the description in connection with rates covering less than carloads shipments of lime to include shipments in paper bags, packed in cartons.

9934. Cement, Lime and Plaster, L. C. L., from Memphis, Tenn., to stations on Okolona branch of the Mobile & Ohio. At present, class rates apply. Proposed rates: To Houston, Miss., and intermediate points, 28 cents; to Calhoun City, Miss., and intermediate points, 35 cents per 100 lb.

Southwestern Freight Bureau

8280. Stone. To establish rate of 12½ cents per 100 lb. on crushed stone, carloads, minimum weight marked capacity of car from Garnett, Okla., to Silverdale, Kan. Remarks: It is claimed that the present class rate is too high to permit movement of the traffic.

8335. Gravel. To establish on gravel, carloads, from Whiate Cliffs, Ark., to Shreveport, La., rate of 6½ cents per 100 lb. Remarks: Shippers at White Cliffs, Ark., have requested establishment of this rate to enable them to compete on road building contracts at Shreveport.

8365. Lime. To establish rate of 20½ cents per 100 lb. on lime, carloads, from Mercer, Ark., to New Orleans, La. Remarks. It is contended that this rate should be established from Mercer, since it is now in effect from Ruddells and Johnsons, Ark., cross country points in the same general locality as Mercer.

8371. Chatts, Stone, etc. To amend Item 316, S. W. L. Trf. 55G, applying on chatts, stone, etc., from, to and between points in Oklahoma, intrastate, by making joint line differentials the same regardless of length of hauls. Remarks: It is contended that the present adjustment should be corrected and the differentials for distances over 250 miles should be at least not higher than they are for short distances.

8385. Cement. To revise rates on cement from Ada, Dewey, and Hartshorne, Okla., to points on the Fort Worth & Denver City, in compliance with the order from the commission, stating that it would be necessary that existing fourth section violations be cleared up.

8404. Silica Sand. To establish rate of 15 cents per 100 lb. on silica sand, carloads, minimum weight 90 per cent of marked capacity of car, from Dustin, Okla., to St. Louis, Mo. Remarks: There are no commodity rates in effect on silica sand, from Dustin, Okla., to St. Louis, Mo., and it is claimed that the proposed adjustment will place the rate from Dustin to St. Louis on a parity with rates from Pacific and other Missouri points to Oklahoma points.

8411. Gravel. To comply with order of the I. C. C. in I. C. C. Dkt. 12005 covering rates on gravel, C. L., from Milwaukee, Gravel Pit and Bearden, Ark., to Lucas, La.

Texas-Louisiana Bureau

5205-TX. Sand, Gravel and Shells, C. L., rates on between points in Texas: Proposition from shippers to reduce current rates on gravel, sand and shells, taken from streams and waters between points in Texas, 10 per cent. Shippers state proposed reduction would decrease number of inland gravel pits, conserve land, and assist in the building of good roads.

Western Trunk Line

1564C. Crushed Stone, C. L., from Sioux Falls, S. D., to Keokuk, Iowa, present, 11 cents per 100 lb.; proposed, 11½ cents.

3138. Cement, C. L., stopping in transit to partly unload, from Kansas gas belt to points in Western Trunk Line territory, present, when destined to points east or west of the Missouri river only one stop is permitted at Missouri river or points south and west thereof. No authority to stop and partly unload east of Missouri river. Proposed, To establish same stopping in transit privileges to partly unload as is applicable from mills east of Missouri river published in Rule 1085 W. T. L. Circular 1P.

2085B. Plaster, Stucco, Gypsum Rock and Lime, from all points of production to W. T. L. territory, present, rates as per agency and individual lines' tariff, proposed, to establish rates on plaster, etc., on the basis of the scale prescribed by the I. C. C. in Dkt. 10614.

New York State Crushed Stone Bids

BIDS for road stone, f.o.b. plant, made by two New York state producers to Herkimer county, May 5, were as follows:

From Newport Crushed Stone Co., Newport, for limestone screenings, 80 cents per ton; for oiling or pea stone, $1.40; for No. 1 and No. 2 stone, $1.40; for No. 3 stone, $1.30; from General Crushed Stone Co., of Little Falls, for dust, 50 cents per ton net; for other stone, $1.40 per ton. It was decided that each company would be given opportunity to provide the stone necessary in the localities nearest the plant.

New Memberships of National Crushed Stone Association Since March 26 to May 10

	Number of Memberships
C. B. Magrath, Consumers Co., Chicago, Ill.	1
L. H. Seward, Consumers Co., Chicago, Ill.	1
J. C. Budding, Lancaster, Pa.	1
O. P. Chamberlin, Dolese & Shepard Co., Chicago, Ill.	1
Brownell Improvement Co., Chicago, Ill.	2
Monon Crushed Stone Co., Monon, Ind.	2
Bluffton-Lewisburg Stone Co., Lima, Ohio	2
Lambertville Stone Quarry Co., Philadelphia, Pa.	2
New Associate Members	
Easton Car & Construction Co., Easton, Pa.	1
Koehring Co., Milwaukee, Wis.	1
American Hoist and Derrick Co., St. Paul, Minn.	1
Austin Mfg. Co., Chicago, Ill.	1
Flexible Steel Lacing Co., Chicago, Ill.	1
Ensign-Bickford Co., Simsbury, Conn.	1
Worthington Pump and Machinery Corp., Cudahy, Wis.	1

Electrically Sintered Magnesite

ELECTRICALLY sintered magnesite, a material having the highest melting point of any commercial refractory, is now being produced in quantity by the Carborundum Co. It is made from carefully selected California magnesite and is thoroughly fused in an electric furnace. It contains about 95 per cent MgO and less than 1 per cent of iron oxide; has a melting point of 2600 deg.

The material is especially resistant at high temperatures to iron or iron oxide. This makes it most valuable for lining metallurgical furnaces, either in the form of bricks or in granular form, tamped in. A further unusual feature of electrically sintered magnesite is that it does not contract when subjected to conditions encountered in industrial installations.—*Chemical and Metallurgical Engineering.*

Quarried from Life

By Liman Sandrock

The Gentleman from Indiana

ONE of our American novelists—Booth Tarkington, we think—once wrote a novel with the above title, and it had a vogue that made it known all over these well-known states. There's nothing in any way remarkable in the statement that Indiana should raise gentlemen, or that she still keeps up the good work. Nor is it any new thing to the most of our readers that Fred W. Connell holds forth in that state as executive secretary of the Indiana Crushed Stone Association—has, in fact, been the holder of that office for the past nine years.

Although not a native son, he is another gentleman added to Indiana's honor roll. He was born in Wisconsin in—— Here's his picture, a good picture. How old would you say he was? That's what we would say he was, too. At any rate, it was long enough ago for him to have acquired a maturity that eminently qualifies him to run in the Grownup Sweepstakes. Age, after all, depends upon its intelligent handling, whether we have in mind those years-young chaps like Chauncey Depew and Uncle Joe Cannon or youngsters like Brad Pierce, Ed Lamkin or Tom Sullivan.

Highway work first attracted Mr. Connell to the rock products industry along in 1909, when he became the Indiana representative of the American Asphalt Co. Two years later he came to Chicago as assistant manager of that company in its road department.

His experience in Indiana, coupled with his later work in the environs of the Windy City, soon had him sufficiently equipped to go East as the company's New York manager. One can learn a lot of things in that little village, too, if he keeps his ear to the ground. Fred did.

In January, 1914, however, the American Asphalt Co. liquidated its affairs and Mr. Connell shook the East dust from his shoes and returned to Indiana. He had been "living wisdom with each studious year."

He was then appointed to the secretaryship of the Indiana Crushed Stone Association, when his work in that state a few years before had made him familiar with that industry because of his promotion of bituminous macadam construction, which consists of crushed limestone and bituminous material.

"I have not been much of a success as a candidate for an interview, Sandrock," he told us. "Of course, I am appreciative of any little thing you may be pleased to say about me personally, but I am more than anxious that you give all possible publicity to Indiana's crushed stone industry."

All of our secretaries are A1 fellows, without exception, and the industry is main

Fred W. Connell, Secretary of the Indiana Crushed Stone Association

proud of them. Of course, we have our favorites and will now and again revert to the trite expression in use before the Great Drought: "All are good, but some are better than others."

"Just Among Ourselves"

THIS caption stands at the head of the Rockland and Rockport Lime Corp. bulletin. It's an intensely human document reflecting the doings, the joys and sorrows of the folks at the plant—homey, intimate, and inspiring.

For instance: Jerry Sullivan has quit.—George Ulmer has returned as dumper.—A stuffed alligator now "adorns" Superintendent Adams' new rolltop.—James Cates is painting his house (and his jeans).—Patsey Rometo is back and Eddie Beebe has gone to breaking.—The repair shop has a new drinking-fountain.—"What Happened to Riley?" is a poem.—Tony Delmonico's friend Generoso Discepolo is held up at Ellis Island.—Calvin Aldus is jobbing awhile to relieve his stomach trouble; Bean Cross is subbing for him.—And the company store says, "It's time to plant your garden seeds; we have all kinds."

A Fifty-Eighth Variety

WE quote this recipe from the *Dry Goods Economist*—a name somewhat at variance with the recipe:

"Chase wild bullfrogs for three miles and gather up the hops. To them add 10 gal. of tanbark, ½ pint of shellac, and 1 bar of homemade soap. Boil 36 hr., then strain through an I. W. W. sock to keep it (meaning the mixture, not the sock) from working. Add 1 grasshopper to each pint to give it a kick. Pour it into the kitchen sink; if it takes the enamel off it is ready for bottling."

They Wanted a Good One Bad

WHEN the new American Lime and Stone Co. office building at Bellefonte, Pa., was opened a dance was arranged for—and the local orchestra failed them at the last minute. General Superintendent Morris then sent this telegram to Mr. McLanahan at Hollidaysburg:

"Want a *good* orchestra for opening of new office tomorrow night—and we want it *bad!*"

They Said It

KING TUT'S 4323d birthday was celebrated by the Springfield (Mass.) Publicity Club recently. For a dead one, Tut's getting a lot of live publicity.

EARLY New England history relates that in 1821 Ben Lewis, postmaster at West Stockbridge, Mass., complained that he was "somewhat at times pestered by inquiries as to lime." Guess the Grangers Lime Co. in that town is dum thankful for the outcome of that darn pesterin', by tunket!

ADVERTISING ruined one operator's business. He let it all be done by his competitors.

THE COLORADO PORTLAND CEMENT CO. has awarded $125 to a Colorado boy, champion member of the State Fair Pig Club. This boy visited Chicago in December to attend the International Stock Show. Pity he couldn't come here in the summer when pig atmosphere is the strongest thing in town.

SECRETARY R. N. VAN WINKLE: "In days gone by, the engineer, after designing and building the plant, was as welcome around the average quarry as a revenue agent at a bootlegger's picnic." Them was not the happy days. As to that picnic, summer will soon be here—and picnics are our favorite outdoor sport.

THE $12-a-day plasterer has his defense, for the *American Contractor* says: "He earns it. A man must have a hinge or an extra joint back of his neck to succeed in that trade."

HOUSTON TEHEE has been appointed receiver of the Continental Asphalt and Petroleum Co. Is this putting the merry ha-ha over on the stockholders?

Editorial Comment

Suicide or Progress?

The lime industry of the United States faces a genuine crisis, brought about by its own progressiveness. It is now at the end of one epoch and is at the threshold of a new one — amazing beyond comprehension even to those who know and appreciate some of its possibilities. Now, after thousands of years, in which lime manufacturers were content to make *lime*, without attempting to improve upon qualities or to change peculiarities with which Nature seems to have endowed particular limestones, the lime industry has awakened to the possibilities of improving upon Nature's product.

For years a few progressve men in the lime industry have dreamed of bringing the lime industry abreast of other modern industries — of utilizing and applying some of the vast recent accumulations of chemical and geological knowledge to lime manufacture and the *improvement* of lime.

After some five years of more or less abortive attempts and after many changes of policy and organization, the present National Lime Association was evolved, and it has been allowed a year or more, under its present management and present policy, to demonstrate its usefulness. And never before has there been a year so full of vital and momentous developments to the lime industry.

The Lime Association's own research department has made many dicoveries of far-reaching significance and importance, but more than that, the obvious awakening of the lime industry to the desire for better things has stimulated hundreds of private investigators to efforts which inevitably will lead to patented lime compounds or mixtures of great possible commercial importance.

These discoveries, and the application of more and more chemical knowledge to the manipulation of lime and lime products, may make lime the dominant rock product of the future, or it may lead to the promotion and marketing of a confusion of patented mixtures and "dopes," by which the lime industry, as such, by division into competitive groups of producers, will be practically annihilated, and the genuine virtues of lime as lime will be obscured. Already, manufacturers should have had enough of this confusion in their promotion experience with merely different *forms* of lime.

In the face of these unusual conditions and problems the lime industry obviously needs the strongest and wisest kind of a central, national, policy-determining organization and the strictest adherence to a farsighted, progressive policy. Fortunately, the lime industry has such an organization now, and with the future of this organization rests, in a very large measure, the future of the American lime industry—suicide or progress?

The Railways As Co-operators

Too often rock products producers come to regard the railway companies they have to do business with as necessary evils—as arrogant, unsympathetic monopolies whose arbitrary rulings may mean success or failure to their enterprises. Such notions of railway management are often justified by contact with lesser officials and underlings; the lower the official capacity, the more arrogance is often the rule. Nevertheless, there are officials connected with *every* railway of any account, whose responsibility it is to get and hold business, and if the producer can reach these men with his troubles, whether the officials be presidents, vice-presidents, or development agents, he will find sympathy and business sense. A railway has to sell its services like any other business, and those whose responsibility it is to account for dividends or deficits know this full well. For this reason industrial, agricultural and development departments of the railways are often in much closer touch with the executive managements than the traffic departments.

The work of the railway agricultural and industrial agents, in promoting the use of agricultural lime and limestone, reported in this issue, is an example of the time and effort and money that live railway managements expend in encouraging business for their shippers, or patrons. In the same way they stand ready to assist any worthy project on their lines which will develop more business and more profits to the railway company. This is only ordinary good business, but producers and shippers often fail to take full advantage of it.

During the World War, when the government took over the railways, the railway managements lost practically all their initiative as live American business men and "hustlers." Fortunately, it is returning. The very worst thing that could happen to shippers and producers is for the railways to permanently lose such business initiative, whether it come from government ownership, or government interference. Consequently they will avoid playing into the hands of agitators and short-sighted politicians by not running to Washington with every trouble and every kick.

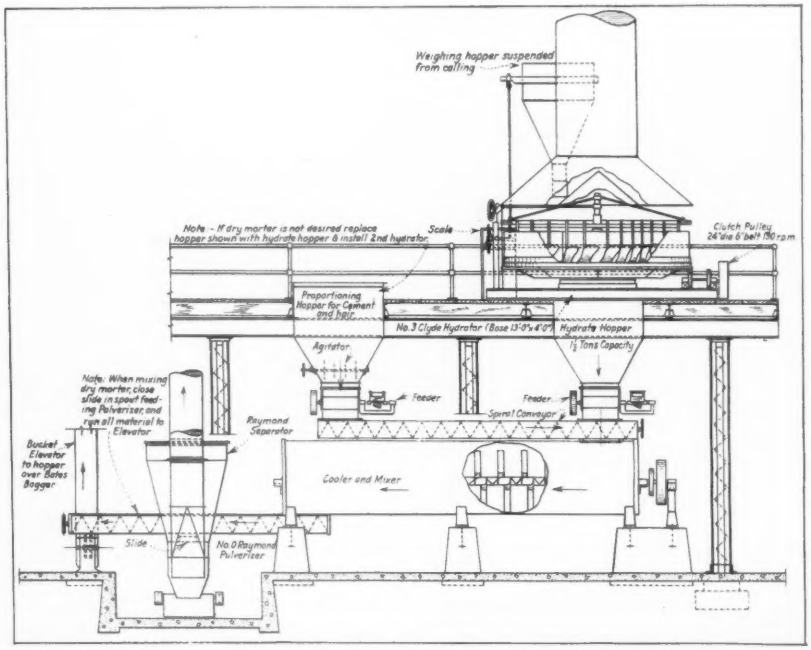
Give your railway co-operators a chance to straighten out the difficulty first—and don't stop with the traffic clerk, or the division traffic man. Take it to headquarters and put it up to business men as a business proposition. If the time ever comes when you can't do that, it will be a sorry day for the railways and a sorry one for shippers as well. The railways have their troubles as well as other businesses; and according to every indication they are now doing all that they can to keep up their end of the national prosperity boom.

New Machinery and Equipment

Combined Process for Hydrating Lime and Making Dry Mortar

H. MISCAMPBELL, Duluth, Minn., has placed on the market a combination machine used for hydrating lime and manufacturing dry mortar from hydrated lime, cement and ox-hair. The hydrating lime process is as follows:

The crushed quicklime is hydrated in a No. 3 Clyde hydrator and dumped in the hydrator hopper slightly damp. The hydrate passes through an automatic feeder to the cooler, and while passing through the cooler it is thoroughly cooled and all the moisture driven off. The material is reclaimed by a spiral conveyor and discharged to a pulverizer and air separator which deposits it in a storage hopper over the valve-bag packer.



Combination machine for hydrating lime and manufacturing dry mortar from lime, cement and ox-hair

In the dry mortar process the lime is hydrated and carried to the cooler as in the hydrated lime process. The cement and hair in the required amounts in the proportioning hopper are passed through a feeder and spiral conveyor to the head end of the cooler. The proportions of cement, hair and lime are accurately controlled by adjustment of the automatic feeder.

The material is thoroughly mixed in the cooler and passes through the second conveyor to the boot of the bucket elevator which discharges to a storage hopper over the bagging machine, this machine being especially designed to sack dry mortar.

Heavy-Duty Locomotive for Mine Haulage

THE Milwaukee Locomotive Mfg. Co., Milwaukee, Wis., has placed on the market a six-ton heavy-duty locomotive designated as "Type L-30," designed primarily for mine haulage wherever severe service requirements demand a locomotive of extraordinary power, limited over all dimensions, and extreme ruggedness in design.

Type L-30 six-ton gasoline locomotive with inside wheels and gear-chain drive

This locomotive in working order weighs about 12,000 lb. and is geared for two speeds of four and eight miles per hour at governed engine speed of 900 r.p.m., at which speed 45 hp. is developed. In low gear, the locomotive has a drawbar pull of 3000 lb. on suitable clean, dry rail. For track gage of less than 35 in., the locomotive has a gear drive from transmission to drive axle and roller chain and sprocket drive from axle to axle, applying power to all four wheels. Provision is made for taking care of chain wear.

For track gage of 35 in. or wider, this locomotive has a direct-gear drive from transmission to the drive axle, the drive from wheel to wheel being accomplished by side-rods which supply power to all four wheels. The wheels are 18 in. outside diameter, with steel tires shrunk on the cast-iron centers.

The frame is of the open bar steel type and has steel bumpers with anti-climb lugs. The journal boxes have removable bronze bearings and removable guides.

The transmission is of the double-clutch type, and speed changes are effected by means of jaw clutches with all gears in mesh.

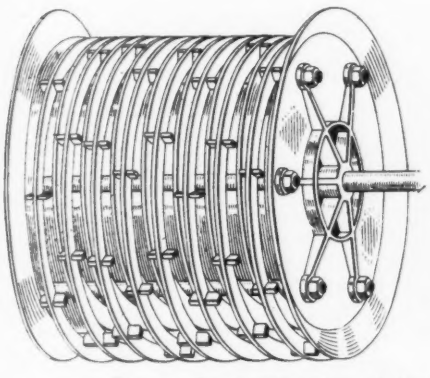
The engine is of the four-cylinder, four-cycle type. The cylinder heads are removable, and the lower sectional crankcase is provided with hand holes for the inspection of bearings. The engine is equipped with a high-tension magneto, electric generator, starting motor, water circulating pump, and maximum speed regulating governor. The carburetor has a hot air connection, and the speed regulating governor is so designed that it cannot be tampered with without detection. Exhaust and intake valves are interchangeable, the valve tappets and push-rods being enclosed by removable dust-proof covers. A circulating oil pump provides positive lubrication.

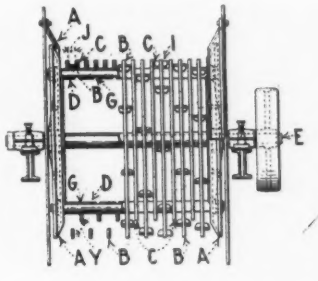
The radiator is of the tubular type, and

of ample cooling capacity. All headers are provided with deflector plates, causing the water to flow from tube to tube in its downward course. The header plates may be easily removed for inspection or cleaning of the tubes without detaching the radiator proper from the locomotive.

New Type of Ring Grizzly

A NEW type of revolving grizzly, shown in Fig. 1 and embodying ideas and principles that are novel, has recently been put through a successful trial at the Copper Queen concentrator, near Bisbee, Ariz. It is invented by H. Kenyon Burch, the designer of the mill. This grizzly is put on the market by the Stephens-Adamson Co., Aurora, Ill.





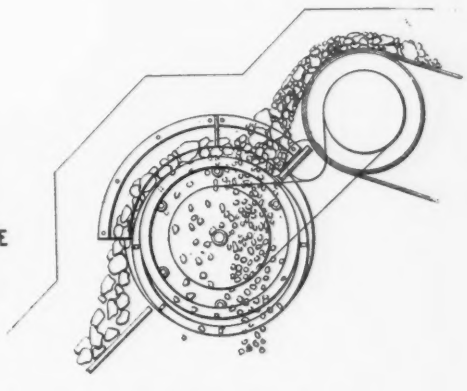


Fig. 1. Perspective view of Burch ring grizzly. Fig. 2. Details of construction. Fig. 3. Side elevation

Fig. 2 shows the details of construction. Two disks or heads *A* are connected by rods *G* and shaft *E*. The ends of the shaft extend through the heads for support on bearings and to take the driving pulley, as shown. Rings of two diameters are used. Spacers *D* are placed on the rods *G* to hold the smaller rings *C* in position, the inside diameters of which are made to fit the rods closely. The larger-diameter rings *B* are held midway between the smaller-diameter rings by lugs *I*.

Thus, undersize that passes between the smaller and larger-diameter rings at *J* will meet with no resistance in passing out between the same rings at *Y*, because the opening at the bottom is greater, due to the larger diameter of ring *B* as compared with ring *C*. Fig. 3 is a side elevation of the grizzly, showing method of feeding and a diagram showing the separation obtained.

The machine, which is patented, has the merits of ruggedness, simplicity, and low power requirements.

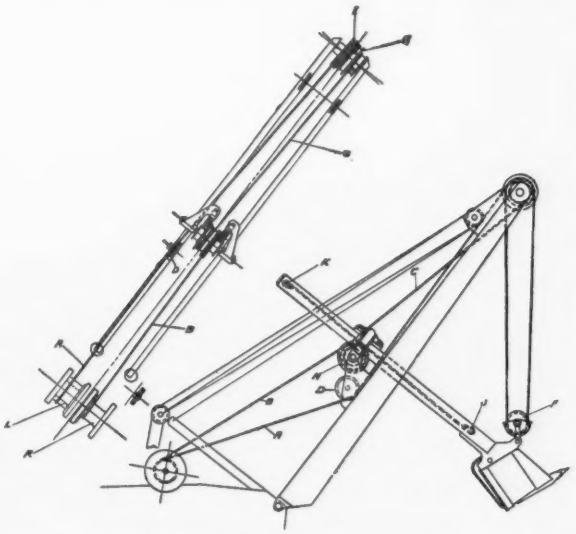
Shovel Has Ingenious Cable Arrangement

THE accompanying diagram will be of interest to operators of steam or gas shovels. It shows the ingenious cable arrangement of the Northwest gas shovel, an arrangement that does away with separate gears, pinions, racks or auxiliary engines for the operation of the dipper stick, states the Northwest Engineering Co., Chicago.

The full power of the 57-hp. gas engine is applied to the dipper lip for crowding. The makers say that the Northwest digs as it hoists—that instead of this being two separate movements, one out and one up, hoisting is a continuous movement. In consequence, a breaking or prying action is exerted on the material being dug.

The diagram also shows the cable arrangement. Hoisting line A runs from left-hand drum L, under guide sheave D, over point sheave E, down through padlock sheave F, and back up to large size compound drum G, at boom point, where it is dead-ended.

The inward thrusting line B runs from



A gas shovel cable arrangement

right-hand drum R over groove in shipper shaft drum H, down between the two parts of dipper stick to dead-end J. The outward thrusting line C runs from small side of compound G (upon which it is wound in a direction opposite to that of hoisting line A) around wide part of shipper shaft drum H and up to dead-end K at head of dipper stick. The shipper shaft drum H turns freely about the stationary shaft, and boom point drum turns freely about the stationary point shaft.

This arrangement, it is said, gives from 15 to 25 per cent greater power at the dipper lip and cuts maintenance costs.

An Improved Form of Explosive

THE new improved form of Gelatin recently placed on the market by the Atlas Powder Co., Wilmington, Del., says the company, is reported from all sections where it has been used as giving extraordinary results—not only in its efficiency as an explosive but in respect to the negligible amount of fumes evolved.

One foreman advises that "his men are strong for the new Gelatin as they have cut down on the number of sticks to the hole and cut out three fans as gas don't bother at all." A resident engineer on a large tunnel operation reports that "his men could return to work in from 12 to 18 min., while with the old style Gelatin it required at least 30 min. before the men could return, and then they could not stay.

The manufacturer also advises that it is extremely high in water resistance and practically perfect in plasticity—two properties that are of extreme importance in most underground operations, where wet work is often encountered and where loading in upward or pitching holes is necessary so frequently.

THE NATIONAL LIME ASSOCIATION holds its fifth annual convention in New York City on June 13, 14 and 15.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.25	1.10	1.10	1.10	.....
Buffalo, N. Y.			1.30 per net ton all sizes			
Chaumont, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	.....
Coldwater, N. Y.			1.50 per net ton all sizes			
Eastern Pennsylvania	1.25	1.35	1.40	1.35	1.25	1.25
Munns, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Prospect, N. Y.	.80	1.30	1.40	1.30	1.30	.....
Walford, Pa.	1.55	1.55	1.55	1.55	1.55	1.55
Watertown, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill.	1.50	.....	1.50	1.35	.....	.....
Buffalo, Iowa	.70	.....	1.35	1.15	1.20	1.20
Bloomville, Middlepoint, Dunkirk, Bellevue, Ohio	1.00	1.10	1.10	1.00	1.00	1.00
Chasco, Ill.	1.30	1.25	1.25	1.25	1.20	.....
Chicago, Ill.	.80	1.50	1.10	1.10	1.10	1.10
Dundas, Ont.	.95	1.35	1.35	1.35	1.10	1.10
Greencastle, Ind.	1.25	1.10	1.00	.90@1.00	.90@1.00	.90@1.00
Krause, Columbia and Valmeyer, Ill.	1.00@1.30	1.00@1.30	1.00@1.30	1.00@1.30	1.00@1.30	1.30@1.50
Lannon, Wis.	.80	1.10	1.10	1.00	1.00	.95
Mitchell, Ind.	1.00	1.00	1.00	1.00	1.00	1.00
Montreal, Canada	.90	1.20	1.10	1.00	.95	.95
Montrose, Iowa	.....	1.50	1.60	1.55	1.45	1.40
Sheboygan, Wis.	1.10	1.10	1.10	1.10	.....	.....
Southern Illinois	1.35	1.25	1.25	1.25	1.20	.....
Stolle, Ill. (I. C. R. R.)	1.30	.....	1.35	1.35	1.35	1.35
Stone City, Iowa	.75	.....	1.50	1.40	1.35	.....
Toledo, Ohio	1.60	1.70	1.70	1.70	1.60	1.60
Toronto, Canada	1.90	2.25	2.25	2.25	2.00	2.00
			Prices include 90c freight			
Waukesha, Wis.	1.00	1.00	1.00	1.00	1.00	1.00
SOUTHERN:						
Alderson, W. Va.	.75	1.25	1.40	1.25	1.15	.....
Bridgeport, Texas	1.40	1.40	1.40	1.40	1.25	1.25
Bromide, Okla.	.75	2.00	1.75	1.60	1.50	1.25
Cartersville, Ga.	1.25	1.75	1.75	1.15	1.15	1.15
Chickamauga, Tenn.	1.00@1.25	1.00@1.25	1.10@1.25	1.10@1.25	1.10@1.25	.....
El Paso, Texas	1.00	1.00	1.00	1.00	.....	.....
Ft. Springs, W. Va.	.90	1.45	1.45	1.40	1.35	1.30
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45	.....
Ladds, Ga.	.....	.....	1.40	1.40	1.40	.....
Morris Spur (near Dallas), Tex.	1.25	1.25	1.40	1.40	1.40	1.25
WESTERN:						
Atchison, Kans.	.50	1.90	1.90	1.80	1.80	1.80
Blue Spr'gs and Wymore, Neb.	.20	1.55	1.55	1.45	1.35	1.30
Cape Girardeau, Mo.	1.35	.....	1.10	1.35	1.10	.....
Kansas City, Mo.	1.00	1.50	1.50	1.50	1.50	1.50

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.50	1.35	1.15	1.00	.....
Bound Brook, N. J.	1.70	2.10	1.80	1.50	1.40	.....
Dresser Jct., Wis.	1.00	2.25	.....	1.75	2.00	.....
Duluth, Minn.	1.00	2.25	1.90	1.50	1.50	.....
E. Summit, N. J.	1.80	2.30	1.90	1.60	1.40	.....
Eastern Massachusetts	.85	1.75	1.75	1.40	1.40	1.40
Eastern New York	.75	1.50	1.50	1.30	1.40	1.30
Eastern Pennsylvania	1.25	1.55	1.50	1.40	1.40	1.40
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60	1.50@2.00	1.35@1.50	1.15@1.25	1.00@1.10	.....
Oakland, Calif.	1.75	1.75	1.75	1.75	1.75	.....
Richmond, Calif.	.50*	.....	1.50*	1.50*	1.50*	.....
Spring Valley, Calif.	.70	1.55	1.50	1.40	1.35	1.35
Springfield, N. J.	2.00	2.20	2.00	1.75	1.60	1.60
Westfield, Mass.	.60	1.35	1.25	1.10	1.00	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Atlanta, Ga.—Granite	1.47	2.07	2.07	1.97	1.97	.....
Buffalo, N. Y.—Granite	.90	.....	1.20	1.00	1.05	1.10
Berlin, Utley and Red Granite, Wis.	1.60	1.70	1.60	1.50	1.40	.....
Columbia, S. C.—Granite	.50	.....	2.00@2.50	2.00	.....	1.75@2.00
Dundas, Ont.—Limestone	1.00	1.35	1.35	1.25	1.10	1.10
Eastern Penna.—Sandstone	.85	1.60	1.55	1.35	1.35	1.30
Eastern Penna.—Quartzite	1.20	1.35	1.20	1.20	1.20	1.20
Lithonia, Ga.—Granite	.75	1.75	1.50	1.35	1.25	1.25
Lohrville, Wis.—Cr. Granite	1.35	1.40	1.30	.....	1.20	.....
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@1.50
San Diego, Calif.	.50@ .70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	1.25@1.55
Sioux Falls, S. D.—Granite	1.00	1.60	1.55	.....	1.50	.....

*Cubic yard. †Agrl. lime. ||R.R. ballast. §Flux. ‡Rip-rap, a 3-inch and less.

Agricultural Limestone

(Pulverized)

Chaumont, N. Y.—Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$—Thru 100 mesh; sacks, 4.00; bulk	2.50
Grove City, Pa.—Analysis, 94.89% $CaCO_3$, 1.50% $MgCO_3$; 60% thru 100 mesh; 45% thru 200 mesh; 100% thru 20 mesh; sacks, 5.00	3.50
Hillsville, Pa.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; sacks, 5.00; bulk	3.50
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
New Castle, Pa.—96% $CaCO_3$ 1.40% $MgCO_3$—75% thru 100 mesh, 94% thru 50 mesh; sacks, 5.00; bulk	3.50
Walford, Pa.—Analysis, 50% thru 100 mesh; 4.50 in paper; bulk	3.00
Watertown, N. Y.—Analysis, 96% **$CaCO_3$; .02% $MgCO_3$; 90%** thru 100 mesh; bulk, 3.00; sacks	4.50
West Stockbridge, Mass., Danbury, Conn., North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.25—cloth, 4.75; bulk	3.00
Alton, Ill.—Analysis, 97% $CaCO_3$, 50% thru 4 mesh	4.00
0.1% $MgCO_3$; 90% thru 100 mesh	6.00
Belleville, Ont.—Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk	2.50
Chasco, Ill.—Analysis, 96.12% $CaCO_3$, 2.5% $MgCO_3$; 90% thru 100 mesh	5.00
90% thru 50 mesh	1.35
Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh	1.80@3.80
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80-lb. paper sacks	5.00
Bulk	3.50
Piqua, Ohio—100% thru 100 mesh; bulk, 5.50; bags	7.00
50% thru 100 mesh; bulk, 2.10; bags	2.25
80% thru 100 mesh; bulk, 3.50; bags	5.00
Yellow Springs, Ohio—Analysis, 96.08% $CaCO_3$, 63% $MgCO_3$; 32% thru 100 mesh; 95.57%, sacked, 6.00; bulk	4.25
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 50% thru 100 mesh	1.50
Hot Springs, N. C.—50% thru 100 mesh; sacks, 4.25; bulk	2.70
Knoxville, Tenn.—80% thru 100 mesh	2.70
80% thru 200 mesh	3.50
(Bags 1.25 extra)	
Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; bulk	2.75
Mountville, Va.—Analysis, 76.60% $CaCO_3$, 22.83% $MgCO_3$—50% thru 100 mesh; 100% thru 20 mesh; sacks	5.00
Colton Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk	4.00
Lemon Cove, Calif.—Analysis, 94.8% $CaCO_3$, 0.42% $MgCO_3$; 60% thru 200 mesh; sacks, 5.25; bulk	4.50

Agricultural Limestone

(Crushed)

Alton, Ill.—Analysis, 98% $CaCO_3$, 0.1% $MgCO_3$; 90% thru 50 mesh	1.50
Bellevue, Ohio—Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; ¼ in. to dust, about 20% thru 100 mesh	1.25
Bettendorf, Iowa, and Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.25
Buffalo, Iowa—90% thru 4 mesh	1.00
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 100% thru 10 mesh, 90% thru 50 mesh, 90% thru 4 mesh, cu. yd	1.50 1.35
Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$; 90% thru 4 mesh	.80
Columbia, Ill., near East St. Louis—½-in. down	1.25@ 1.80
Elmhurst, Ill.—Analysis, 35.73% $CaCO_3$, 20.69% $MgCO_3$; 50% thru 50 mesh	1.25
Huntington and Bluffton, Ind.—Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; about 20% thru 100 mesh	1.25

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Agricultural Limestone

(Continued from preceding page)

Greencastle, Indiana.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	2.00
Kansas City, Mo.—50% thru 100 mesh	1.50
Krause and Columbia, Ill.—Analysis, 90% $CaCO_3$, 90% thru 4 mesh	1.20
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 32% thru 50 mesh; 51% thru 50 mesh; 100% thru 4 mesh; 83% thru 10 mesh; bulk	1.25
Milltown, Indiana.—Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$; 33.6% thru 100 mesh, 40% thru 50 mesh	1.25@ 1.65
Mitchell, Ind.—Analysis, 97% $CaCO_3$, 1% $MgCO_3$; 50% thru 100 mesh, 90% thru 4 mesh	1.25
Montrose, Iowa.—90% thru 100 mesh	1.25
Narlo, Ohio.—Analysis, 56% $CaCO_3$ 43% $MgCO_3$; limestone screenings, 37% thru 100 mesh, 55% thru 50 mesh, 100% thru 4 mesh	1.50@ 2.00
Ohio (different points), 20% thru 100 mesh, bulk	1.25@ 1.50
Piqua, Ohio—100% thru 4 mesh	1.55
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stolle, Ill., near East St. Louis on I. C. R. R.—Thru ½-in. mesh	1.30
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Toledo, Ohio.—¼ in. to dust, 30% thru 100 mesh	1.50
Waukesha, Wis.—No. 1 kiln dried	2.00
No. 2 Natural	1.75
Alderson, W. Va. — Analysis, 90½% $CaCO_3$; 90% thru 50 mesh	1.75
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 90% thru 50 mesh	1.50
Cartersville, Georgia.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$—all passing 10 mesh	1.75
Claremont, Va.—Analysis, 92% $CaCO_3$, 2% $MgCO_3$; 90% thru 50 mesh	3.00
50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh	2.75
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 100 mesh	1.50
Ladds, Ga.—50% thru 50 mesh	2.00
Garnett, Okla.—Analysis, 80% $CaCO_3$, 3% $MgCO_3$; 50% thru 50 mesh	.50
Kansas City, Mo., Corrigan Siding—50% thru 100 mesh; bulk	1.80
Tulsa, Okla.—90% thru 4 mesh	.50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

Glass Sand:	
Berkeley Springs, W. Va.	2.25@ 2.50
Cedarville and South Vineland, N. J.—Damp, 1.75; dry	2.25
Cheshire, Mass.—Damp	2.50
Columbus, Ohio	1.50@ 2.00
Dunbar, Pa.—Damp	2.50
Falls Creek, Pa.	2.25
Hancock, Md.—Damp, 1.50; dry	2.00
Klondike and Pacific, Mo.	2.00@ 2.50
Mapleton, Pa.	2.25@ 2.50
Mapleton Depot, Pa.—Dry	2.75
Massillon, Ohio	3.50
Michigan City, Ind.	.50
Millville, N. J.—Wet, 1.75; dry	2.25
Mineral Ridge, Ohio	3.00
Montoursville, Pa.	2.00
Oregon, Ill.	2.50
Ottawa, Ill.	1.50@ 1.75
Pittsburgh, Pa.—Dry, 4.00; damp	3.00
Rockwood, Mich.	2.50@ 2.75
Round Top, Md.	2.25@ 2.50
Sands, Pa.	2.50
San Francisco, Calif.	3.00@ 3.50
St. Louis, Mo.	1.25@ 2.50
St. Mary's, Pa.	2.50
Thayers, Pa.	2.25
Utica, Ill.	1.75
Zanesville, Ohio	2.00@ 2.50
Foundry Sand:	
Albany, N. Y.—Molding fine, coarse and brass molding	2.25
Sand blast (kiln dried)	4.00
Core	1.50
Allentown, Pa.—Core and molding fine	1.75@ 2.00
Arenzville, Ill.—Molding fine	1.50@ 1.75
Brass molding	1.75@ 2.00
Beach City, Ohio.—Core, washed and screened	2.00@ 2.50
Furnace lining	2.50@ 3.00
Molding fine and coarse	2.25@ 2.50
Cheshire, Mass.—Furnace lining, molding fine and coarse	5.00
Sand blast	5.00@ 8.00
Stone sawing	6.00
Cleveland, Ohio.—Molding coarse	1.50@ 2.00
Brass molding	1.50@ 2.00
Molding fine	1.50@ 2.25
Core	1.25@ 1.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f.o.b., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Attica, N. Y.	.75	.75	.75	.75	.75	.75
Ambridge and So. Heights, Pa.	1.25	1.25	1.25	.85	.85	.85
Buffalo, N. Y.	1.10	.95			.85	
Erie, Pa.	.75		.90		1.10	
Farmingdale, N. J.	.48	.48	.75	1.10	1.10	
Hartford, Conn.	.90		1.25	1.15	1.15	1.15
Leeds Junction, Me.		.50	1.75	1.35	1.35	1.25
Machias, N. Y.	.85	.75	.95	.85	.85	.85
Pittsburgh, Pa.	1.25	1.25	1.25	.85	.85	.85
Portland, Me.		.50	1.75		1.35	1.35
Washington, D. C. (Rewashed, river)	.75	.75	1.60	1.40	1.20	1.20
CENTRAL:						
Alton, Ill.		.85				
Anson, Wis.	.50	.40				.90
Barton, Wis.		.40@ .60		.50@ .70	.50@ .70	
Beloit, Wis.		.70			.80	
Chicago, Ill.		1.75@2.23	1.75@2.43			
Cincinnati, Ohio	.70	.65	.90	.90	.90	.90
Columbus, Ohio	.75@1.00	.75@1.00	.65@1.00	.75@1.00	.75@1.00	.75@1.00
Des Moines, Iowa	.50	.50	1.60	1.60	1.60	1.60
			Unwashed ballast, .50 ton 60-40 sieves, .85; pebbles, .95			
Dresden, Ohio	.70	.60	.60		.90	
Earlestead (Flint), Mich.	.70					
Eau Claire, Wis.	.40	.40@ .45	1.00@1.25			.85@ .90
Elkhart Lake, Wis.	.66	.60	.80	.76	.70	.70
Ft. Dodge, Iowa		1.22		2.17		
Grand Rapids, Mich.		.50		.80	.70	
Hamilton, Ohio					.90	
Hawarden, Iowa	.60	.50			1.60	
Hersey, Mich.	.50	.50			.75	.75
Indianapolis, Ind.	.60	.60		1.50	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Mason City, Iowa	.65	.65	1.75		.175	1.65
Mankato, Minn. (pit run)	.60	.50			1.35	
Milwaukee, Wis.	1.11	1.11	1.36	1.36	1.36	1.36
Minneapolis, Minn.	.35	.35	1.25@1.35	1.25@1.35	1.25	1.25
Moline, Ill.	1.00	1.00	1.30	1.30	1.30	1.30
Riton, Wis.		.40			.60	
St. Louis, Mo., f.o.b. cars	1.20	1.45		1.45		1.45
St. Louis, Mo., deliv. on job	2.05	2.20	2.35	2.15		2.10
Summit Grove, Clinton, Ind.	.65@ .75	.60@ .75	.60@ .75	.60@ .75	.60@ .75	.60@ .75
Terre Haute, Ind.	.75	.60	1.00	.75	.75	.75
Waukesha, Wis.	.50	.50	.80	.80	.80	.80
Winona, Minn.	.50	.50	1.25	1.25	1.10	1.10
			(.05 ton discount 10 days)			
SOUTHERN:						
Atlanta, Ga.	.75	.75		.90	.90	.90
Birmingham, Ala.	1.48		all gravel 1.88			
Charleston, W. Va.	all sand 1.40		all gravel 1.50			
Estill Springs, Tenn.	1.35	1.35		1.00	.85	.65
Ft. Worth, Texas	1.75	1.75	1.75	1.75	1.75	1.75
Jackson's Lake, Ala.	.50@ .60	.50@ .60	.40@1.00	1.00	.50@1.00	.50@1.00
Knoxville, Tenn.	1.00	1.00	1.00	1.00	1.00	1.00
Lake Weir, Fla.		.60				
Macon, Ga.		.50@ .75				
Memphis, Tenn.	1.00	1.00	1.80	1.80	1.80	1.80
N. Martinsville, W. Va.	1.00	1.00		1.20	1.00	.80
New Orleans, La.	.25			.85		
Roseland, La.	.50		.85	.85		
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.			(Kaw river sand, car lots, .75 per ton; Missouri river, .85)			
Los Angeles, Calif.		.70	1.20	1.20	1.10	1.10
Pueblo, Colo.	1.10*	.90*		1.50*		
San Diego, Calif.†	.50@ .70	.80@1.00	1.30@1.80	1.35@1.65	1.10@1.40	1.10@1.40
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.25*	1.25*	1.50*	1.25*	1.25*	1.25*
Spring Valley, Calif.	.70	.80	1.40	1.35	1.25	1.25

Bank Run Sand and Gravel

City or shipping point	Fine sand, 1/10 in.	Sand, ¼ in.	Gravel, ½ in.	Gravel, 1 in.	Gravel, 1½ in.	Gravel, 2 in.
Atlanta, Ga.	.30@ .40	.30@ .40				
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Cape Girardeau, Mo.			River sand, .80 per yd.			
Cherokee, Iowa			.80 per ton—1.20 washed			
Dresden, Ohio		.60				
Dudley, Ky. (crushed sand)	1.00	1.00		.90		
East Hartford, Conn.			.65 per cu. yd.			
Elkhart Lake, Wis.	.70	.50			.60	.60
Estill Springs, Tenn.						.85
Fishers, N. Y.		.50@ .65		.50@ .65		
Grand Rapids, Mich.						.50
Hamilton, Ohio					.60	
Hartford, Conn.		1.00*				
Hersey, Mich.			.55			
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Texas		1.00				.55
Janesville, Wis.		.65		.65@ .75		
Montezuma, Ind.			Road gravel .50 per ton			
Pine Bluff, Ark.			Road gravel .50			
Rochester, N. Y.	.60@ .75	.60@ .75		.50@ .65	.50@ .65	
Roseland, La.		.75				
Saginaw, Mich., f.o.b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo.			Bank run gravel 1.55			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waco, Texas		.80		1.50		1.30
Winona, Minn.			Clean pit run .60			
York, Pa.		1.00@1.20	(crushed rock sand)			

* Cubic yard. B Bank. L Lake. || Ballast. † Low prices, wholesale; high prices, retail.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.35	1.35	1.35	1.35	1.35	1.35	1.35
E. Canaan, Conn.	4.00	1.00	2.50	1.35	1.25	1.15	1.10
Eastern Penn. and Northern N. J.	2.00	1.20	1.50	1.20	1.20	1.20	1.20
Easton, Pa.	2.50	.80	1.25	1.00	.90	.90	.90
Erie, Pa.		Crushed run slag, 4 in. and less, 1.25@1.35					
Emporium, Pa.			1.35	1.35	1.35	1.35	1.35
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Penn.	2.00	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.			All sizes, 1.50, f.o.b. Chicago				
Detroit, Mich.			All sizes, 1.65, f.o.b. Detroit				
Ironton, O.	2.05	1.45	1.80	1.45	1.45	1.45	1.45
Jackson, O.		1.35		1.35	1.35	1.35	1.35
Steubenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	1.50	1.35	1.35	1.35	1.35	1.35	1.35
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
Steubenville, Lowellville, Canton, O.	2.00	1.35	1.60	1.35	1.35	1.35	1.35
SOUTHERN:							
Alabama City, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ashland, Ky.		1.55		1.55	1.55	1.55	1.55
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton and Low Moor, Roanoke, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Adams, Mass.			7.00				2.90	
Bellefonte, Pa.		10.50§	10.50§	10.50§	9.00		8.50	1.80
Buffalo, N. Y.				12.50				
Berkeley, R. I.			12.00					2.30
Cassadaga, N. Y.			Agricultural marl 7.00@10.00					
Chaumont, N. Y.					2.50	4.00		
Lime Ridge, Pa.							5.00	
West Rutland, Vt.	13.50	12.00					11.00	3.20
West Stockbridge, Mass.								2.25
Williamsport, Pa.			10.00			10.00	6.00	
York, Pa. (dealers' prices)		10.50	10.50					
Zylonite, Mass.	3.20d	2.90d	7.00					
CENTRAL:								
Cold Springs, Ohio		11.00	11.00				10.00	
Delaware, Ohio	12.50	11.00	10.00	11.50			10.00	1.60
Gibsonburg, Ohio	12.50		11.00		9.00	11.00	10.00	
Huntington, Ind.		11.00	10.00		8.00		9.00	
Luckey, Ohio	12.50a		10.00a		9.00			
Marblehead, Ohio		11.00	10.00				10.00	1.60
Marion, Ohio		11.00	10.00				10.00	1.60
Mitchell, Ind.				12.00	11.00		10.00	1.60
Sheboygan, Wis.								7.50d
White Rock, Ohio	12.50				9.00	11.00		
Woodville, O. (dlrs.' price)	12.50a	11.00a	10.50a		9.00		10.00	1.60
SOUTHERN:								
Erin, Tenn.							8.50	1.50
El Paso, Texas							9.00	1.50
Karo, Va.							7.00	
Knoxville, Tenn.	12.50	11.00	11.00	11.00	9.00		9.00	1.50
Ocala and Zuber, Fla.	* 14.00	14.00		14.00				1.75
Sherwood, Tenn.	12.50	11.00	11.00	11.00			8.50	1.50
Staunton, Va.					4.50	5.50	8.50	1.35
WESTERN:								
Colton, Calif.			15.00				19.70	
Kirtland, N. M.							12.50	
San Francisco, Calif.	21.00	21.00	15.00	21.00				2.15*
Tehachapi, Calif.							13.00	2.00

‡100-lb. sacks; *180-lb. net, price per barrel; †180-lb. net, non-returnable metal barrel; §paper sacks. (a) 50-lb. paper bags; terms, 30 days net, 25c per ton or 5c per barrel discount for cash in 10 days from date of invoice; (b) burlap bags; (c) 200-lb. barrels; (d) 280-lb. barrels net.

Miscellaneous Sands

(Continued from preceding page)

Columbus, Ohio.—Core	.50@ 2.00
Sand blast	4.50@ 5.50
Molding fine	**2.75@ 3.00**
Molding coarse	2.00@ 2.50
Brass molding	2.50
Furnace lining	2.00
Molding coarse	1.75@ 2.00
Stone sawing	1.50
Traction	.70@ 1.00
Delaware, N. J.—Molding fine	2.00
Molding coarse	1.90
Brass molding	2.15
Dunbar, Pa.—Traction, damp	2.50
Dundee, Ohio.—Glass, core, sand blast traction	2.50
Molding fine, brass molding (plus 75c for winter loading)	2.00
Molding coarse (plus 75c for winter loading)	1.75
Eau Claire, Wis.—Core	1.00@ 1.25
Sand blast	3.25@ 3.75
Falls Creek, Pa.—Molding, fine and coarse	1.75
Sand blast	2.00
Traction	1.75
Franklin, Pa.—Core	2.00
Furnace lining	2.50
Molding fine and coarse	2.00
Brass molding	2.00
Greenville, Ill.—Molding coarse	1.30@ 1.50
Joliet, Ill.—No. 2 molding sand and loam for luting purposes; milled	.80
Bank run	**.65**
Kansas City, Mo.—Missouri river core	.80
Kasota, Minn.—Molding fine	1.60@ 1.85
Molding coarse, stone sawing	1.45@ 1.75
Klondike, Pacific, Gray Summit, Mo.—Molding fine and coarse	2.00
Mapleton, Pa.—Glass, core, furnace lining, molding fine and coarse; damp, 2.00; dry	**2.75**
Massillon, Ohio—Molding fine and coarse, furnace lining, core	3.00
Traction	2.75
Michigan City, Ind.—Core, traction	.50
Mineral Ridge, Ohio.—Core (green)	2.25
Furnace lining, molding fine and coarse; roofing sand, sand blast, stone sawing, traction brass molding (green)	2.00
Montoursville, Pa.—Core	1.35@ 1.40
Traction	1.00@ 1.10
Brass molding	1.25
New Lexington, Ohio—Molding fine	2.25
Molding coarse	2.00
(.75 extra per ton for winter loading)	
Oregon, Ill.—Core	1.50@ 2.00
Sand blast	4.00
Stone sawing	2.00@ 2.50
Ottawa, Ill.—Core, roofing, brass molding	1.75@ 2.50
Furnace lining, traction	1.50
Sand blast	4.50
Ottawa, Minn.—All crude silica sand	**.75@ 1.00**
Rockwood, Mich.—Core	1.90@ 2.50
Roofing	2.75
Sand blast	**3.75**
Round Top, Md.—Core	1.60@ 1.75
Traction	1.75
Sand blast	2.00@ 2.50

Miscellaneous Sands

(Continued)

San Francisco, Calif. (washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@ 3.50
(Direct from pit)	
Furnace lining, molding coarse, sand blast	3.60
Stone sawing, traction	2.30
St. Louis, Mo.—Red heavy molding	1.50@ 2.25
Red fine	1.50@ 2.00
Molding fine and brass	2.00@ 3.00
Skein core	1.50@ 2.00
White core sand	1.00@ 1.75
Sand blast	2.00@ 4.00
Furnace lining	1.50@ 2.50
Thayers, Pa.—Core	2.00
Furnace lining, molding fine and coarse	1.25
Traction	2.25
Utica, Ill.—Core	1.00
Furnace lining	1.25
Molding fine	.90
Molding coarse	1.00
Roofing sand	1.75
Sand blast	2.50@ 3.50
Stone sawing	2.50
Traction	1.50@ 1.75
Brass molding (crude and dry)	1.00@ 1.75
Utica, Ill.—Core, furnace lining, brass molding	1.00@ 1.75
Molding fine and coarse	.85@ 1.75
Roofing sand and traction	1.75
Sand blast	2.50@ 3.00
Stone sawing	1.75@ 2.50
Warwick, Ohio.—Core, furnace lining, molding, fine and coarse, traction, dry, 2.75; green	2.00
Brass molding, dry	2.50
Zanesville, Ohio.—Molding fine, brass molding	1.75@ 2.00
Molding coarse	1.50@ 1.75

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Asheville, N. C.—Crude talc	4.50
Ground talc (20-50 mesh), bags	6.50
Ground talc (150-200 mesh), bags	8.50
Baltimore, Md.—Crude talc (mine run)	3.00
Ground talc (20-50 mesh), bags	10.00
Ground talc (150-200 mesh), bags	12.00
Cubes	50.00
Blanks (per lb.)	.07
Chatsworth, Ga.—Grinding	7.00
Ground talc (150-200 mesh); bags	15.00@20.00
Pencils and steel workers' crayons (gross)	1.50@ 2.50
Chester, Vt.—Ground talc (150-200 mesh), bulk	6.50@ 8.50
(Bags 1.00 extra)	
Emeryville, N. Y.—325 mesh (double air floated), bags	14.75
Glendale, Calif.—Ground talc (150-200 mesh)	16.00@30.00
(Bags extra)	
Ground talc (50-300 mesh)	13.50@15.50
200 mesh	13.50@14.50
Hailesboro, N. Y.—Ground talc (150-250 mesh), bags	18.00
Henry, Va.—Crude talc (lump mine run) per 2000-lb. ton	2.75@ 3.50
Ground talc (20-50 mesh), bags	8.75@10.00
(150-200 mesh), bags	9.75@12.50
Los Angeles, Calif.—Crude talc f.o.b. Silver Lake	7.00@12.00
Ground talc (150-200 mesh), 100-200 lb. bags)	12.00@14.00
Mertztown, Pa.—Ground talc (20-50 mesh); bulk, 5.00; bags	6.00
(150-200 mesh); bulk, 7.00; bags	8.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@13.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@22.00
(Bags extra)	
Vermont—Ground talc (20-50 mesh); bags	7.50@10.00
Ground talc (150-200 mesh); bags	8.50@15.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	5.00
(Bags 1.00 extra)	
Ground talc (150-200 mesh), bulk	8.00@14.00
(Bags 1.00 extra)	
Pencils and steel workers' crayons, per gross	1.20@ 2.00

Rock Phosphate

(Raw Rock)

Per 2240-lb. Ton

Centerville, Tenn.—B.P.L. 65%	6.00@ 8.50
B.P.L. 65%	6.00
Gordonsburg, Tenn.—B.P.L. 68-72%	6.00@ 6.50
Tennessee—F.o.b. mines, long tons, unground Tennessee brown rock, 72% B.P.L.	7.00
Mt. Pleasant, Tenn.—Analysis, .65-70% B.P.L. (2000 lb.)	6.50
Paris, Idaho.—2000 lb. mine run, B.P.L. 70%	3.50

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$10.20	$8.40	$8.10	$7.50
24x14	10.20	8.40	8.10	7.50
22x12	10.80	8.70	8.40	7.80
22x11	10.80	8.70	8.40	7.80
20x12	12.60	9.00	8.70	8.10
20x10	12.60	9.00	8.70	8.10
18x10	12.60	9.00	8.70	8.10
18x 9	12.60	9.00	8.70	8.10
16x10	12.60	8.70	8.40	7.80
16x 9	12.60	8.70	8.40	7.80
16x 8	12.60	8.70	8.40	7.80
18x12	12.60	9.00	8.70	8.10
16x12	12.60	8.70	8.40	7.80
14x10	11.10	8.40	8.10	7.50
14x 8	11.10	8.40	8.10	7.50
14x 7 to 12x6	9.30	8.10	7.50	7.50
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

(Ground Rock)

Wales, Tenn.—B.P.L. 70%	7.75
Per 2000-lb. ton	
Barton, Fla.—Analysis, 50-65% B.P.L.	3.50@ 8.00
Centerville, Tenn.—B.P.L., 60-65%	6.50
B.P.L. 75% (brown rock)	12.00
Columbia, Tenn.—B.P.L. 68-72%	5.50
B.P.L. 65% (90% thru 200 mesh) bulk	5.50
Montpelier, Idaho. — Analysis, 72% B.P.L., crushed and dried	3.75
Mt. Pleasant, Tenn.—B.P.L. 65%	6.50@ 7.00
Twomey, Tenn.—B.P.L. 65%	6.50

Florida Soft Phosphate

(Raw Land Pebble)

Per Ton

Florida—F. o. b. mines, long ton, 68/66% B.P.L.	3.00
68% (min.)	3.25
70% (min.)	3.50
Jacksonville (Fla.) District	10.00@12.00

(Ground Land Pebble)

Per Ton

Jacksonville, Fla., District. Add 2.50 for sacks.	14.00
Morristown, Fla.—26% phos. acid	16.00
Mt. Pleasant, Tenn.—65-70% B.P.L.	5.00@ 6.00

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	20.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	21.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, creme green and royal green marble	14.00@16.00	16.00@18.00
Slate granules		7.00
Granville, N. Y.—Red slate granules		7.50
Harrisonburg, Va.—Blk. marble (crushed, in bags)		12.50
Ingomar, Ohio (in bags)	6.00@14.00	10.00@25.00
Milwaukee, Wis.		16.00@35.00
New York, N. Y.—Red and yellow Verona		32.00
Middlebrook, Mo.—Red		25.00@30.00
Phillipsb'g, N. J.—Green stucco dash	14.00@16.00	
Poultney, Vt.—Slate granules		7.50
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.		8.00@12.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b., bags 12½c extra	4.50	4.50

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	27.00@35.00
Carpenterville, N. J.	15.00	28.00@36.00
Easton, Pa.	16.00	40.00@60.00
Ensley, Ala.	13.30	21.75
Eugene, Ore.	25.00@26.00	50.00@75.00
Friesland, Wis.	22.00	32.00
Houston, Tex.		19.50
Omaha, Neb.	18.00	30.00@40.00
Portland, Ore. (Del'd)	21.00	45.00@75.00
Puyallup, Wash.	20.00	30.00@75.00
Rapid City, S. D.	18.00	25.00@40.00
St. Paul, Minn.	15.00	30.00@37.50
Salem, Ore.	25.00	35.00@50.00
Salt Lake City, Utah	17.00@18.00	35.00@40.00
Springfield, Ill.	18.00	20.00@25.00
Wauwatosa, Wis.	13.00@14.00	25.00@65.00
Watertown, N. Y.	21.00@22.50	35.00@37.50
Winnipeg, Can.	18.00	26.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	11.00
Boston, Mass.	15.00@16.50
Buffalo, N. Y.	16.50
Dayton, Ohio	12.50@13.50
Grand Rapids, Mich.	12.00
Lancaster, N. Y.	14.00
Michigan City, Ind.	11.00
Milwaukee, Wis. (delivered)	14.00
Minneapolis, Minn.	13.00
Plant City, Fla.	10.00
Portage, Wis.	15.00
Rives Junction, Mich.	12.00
Saginaw, Mich.	12.00
San Antonio, Texas	13.00
San Antonio, Texas (deliv. city lts.)	15.00
South Dayton, Ohio	12.50@13.50
Syracuse, N. Y. (delivered at job)	17.00
F. o. b. cars	15.00
Washington, D. C.	14.50

Gray Clinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton Finishing	Common
Atlanta, Ga.	23.00	20.00
Baltimore, Md.	22.00	16.25
Cincinnati, Ohio	15.80	13.30
Chicago, Ill.	18.00	18.00
Dallas, Tex.	22.50	.....
Denver, Colo.	24.00	.....
Detroit, Mich.	19.50	17.50
Kansas City, Mo.	25.60	24.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	21.00	21.00
New Orleans, La.	.....	17.25
New York, N. Y.	16.80	13.10
Philadelphia, Pa.	15.50	14.50
St. Louis, Mo.	21.40	19.20
San Francisco, Calif.	22.00	16.00
Seattle, Wash. (paper sacks)	24.00	.....

Portland Cement

Current prices per barrel in carload lots f. o. b. cars, without bags.

Atlanta, Ga.	2.80
Boston, Mass.	3.18‡
Buffalo, N. Y.	3.03‡
Cedar Rapids, Iowa	2.48
Cincinnati, Ohio	2.54
Cleveland, Ohio	2.46
Chicago, Ill.	2.20
Dallas, Texas	2.25†
Davenport, Iowa	2.43
Denver, Colo.	2.65
Detroit, Mich.	2.47
Duluth, Minn.	2.14
Indianapolis, Ind.	2.41
Kansas City, Mo.	2.45
Los Angeles, Calif. (less 5c discount)	3.76
Milwaukee, Wis.	2.37
Minneapolis, Minn.	2.39
Montreal, Can. (sacks 20c extra)	2.40
New Orleans, La.	2.83
New York, N. Y.	2.80‡
Philadelphia, Pa.	2.96‡
Phoenix, Ariz.	3.70
Pittsburgh, Pa.	2.24
Portland, Ore.	3.05
San Francisco, Calif.	3.03@3.15**
St. Louis, Mo.	2.35
St. Paul, Minn.	2.39
Seattle, Wash.	2.90*
Toledo, Ohio	2.48

NOTE—Add 40c per bbl. for bags.

**+warehouse.

‡Including sacks; 10c bbl. discount 10 days.

*10c bbl. discount.

†Bags 15c.

F.O.B. Mill Prices, Bulk

Buffington, Ind.	1.95
Cincinnati, Ohio	3.00†
Concrete, Wash.	2.60
Dayton, Ohio	2.85†
Hudson, N. Y.	2.80‡
Indianapolis, Ind.	2.96†
Los Angeles, Calif.	2.80
Louisville, Ky.	2.92†
Memphis, Tenn.	3.24†
Steelton, Minn.	1.95
Universal, Pa.	2.00

‡Includes 15c bags; will be repurchased if in good condition.

†Including cloth sacks.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ and Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	——Plaster Board—— ¼x32x36" Weight 1500 lb. Per M Sq. Ft.	⅜x32x36" Weight 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Douglas, Ariz.	.....	6.00	6.00	.....	13.00	.....	.....	.....	.....	.....	.....	.....	.....
Fort Dodge, Iowa	3.00	3.50	6.00	8.00	10.00	10.50	20.00	.....	21.30	20.00	20.00	.....	30.00
Garbutt, N. Y.	.....	.....	6.00	8.00	10.00	10.00	.....	7.00	.....	.....	.....	20.00	.....
Grand Rapids, Mich.	3.00	.....	5.00	10.00	10.00	10.00	.....	.....	31.00	.....	19.75	20.00	30.00
Hanover, Mont.	4.50	.....	6.00	10.00	.....	10.50	.....	.....	.....	.....	.....	.....	.....
Mound House, Nev.	.....	8.50	6.50	10.50@11.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00+	30.75	21.00	19.375	20.00	30.00
Rapid City, S. D.	4.00	.....	.....	10.00	11.00	11.50	.....	.....	33.75	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	.....	16.40	.....	.....	.....	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Jute Bags, 15c each, $3.00 per ton; Paper Bags, $1.00 per ton extra.

*Shipment in bulk 25c per ton less; ‡Bond plaster $1.50 per ton additional; +Sanded Wood Fiber $2.50 per ton additional; §White Moulding 50c per ton additional; ‖Bulk; (a) Includes sacks.

Accident Prevention

Cement Dust Is Not Harmful

WE again have an example showing that we are successful in proving that cement is in no way harmful to the workman at cement mills. A company recently was forced to defend a claim entered against it by one of its employes who alleged that he contracted bronchial pneumonia by reason of inhaling cement dust while employed at the plant; was ill with it for over a year, and that later it developed into chronic empyema.

After very careful consideration of all the facts in connection with this case and after examination of several experts the Industrial Accident Commissions acting on the case rendered the following decision:

"The evidence is not sufficient to establish that said sickness was proximately caused by said employment or by the condition in which the applicant was working therein."

In a recent issue of *Accident Prevention Bulletin* mention was made of the fact that an insurance company after having examined data on the effect of cement dust on the health of those exposed to it came to the conclusion that they could write standard life insurance policies on cement plant employes at rates no higher than would apply if the men were not exposed to the dust.

Watch Your Coal Houses

SINCE the beginning of this year, there were seven accidents due to coaldust explosions. Four men have lost their lives. During 1922 there were three men killed, and several injured in coaldust explosions. During 1921 we had only one man killed due to this hazard. Are we in danger of disregarding the coal house hazard?

Coal dust constitutes our greatest hazard. More men have been killed by coaldust explosions than by dynamiting during the last 10 years in the cement industry. The great majority of coaldust explosions occur during repair work or immediately following the starting of the machinery after a shutdown. The reason for this is obvious. When we know the time of particular danger, it should be so much easier to take precautions.

Important Invention a Result of Accidents

EVERY cement plant operator is familiar with the Fuller-Kinyon system for conveying powdered coal, cement and similar products, but possibly few know the circumstances under which it was created. J. W. Fuller, president of the Allentown Portland Cement Co. and president of the Fuller-Lehigh Co., recently threw some light on the early history of this important invention.

"Some time ago," said Mr. Fuller, "at the Allentown Portland Cement Co.'s plant a man took off the cover placed over a screw conveyor in the clinker room and somehow he stepped into the conveyor and had a leg cut off. Within five days another man did the same thing in the raw department and he had both legs cut off.

"This was so horrifying to me that I called our engineers together and assigned one engineer to design a cable system for conveying materials, another to a blowing system and another to a pumping system. At the end of about 10 months' experimenting we decided that the pumping system had much more merit than any of the others and we immediately introduced it."

Mr. Fuller has shown some good can come even from a serious accident—if serious thought is devoted toward making its repetition impossible. He started out with the idea of forever eliminating screw conveyor accidents. The result was the Fuller-Kinyon conveying system.

How many of the accidents occuring at your plant can you permanently eliminate like Mr. Fuller did?—*Accident Prevention Bulletin.*

Personal Liability

ADVANCE is being made, steady if slow, toward establishing the doctrine of personal liability for preventable accidents. During the past year or two several cities have been added to the small list of those which place the cost of fire-fighting on the person whose negligence caused the fire; a dozen communities now follow this practice.

The doctrine is general however. It applies to other forms of accident than fire, to railroad operation and to building, for instance, and we trust that in no too far distant time it may be made practically effective here by the joint force of statute, popular conviction and judicial interpretation. It tends to build up the habit of taking care in place of our well-recognized national tendency to neglect and carelessness. The forest fire, the broken arm and the train wrecked by a rotten tie will all be less common when that habit has become established. —*Engineering News-Record.*

Building Wisely Is Building Safely

BY realizing our mistakes we should secure benefits in the future. Many of the difficult problems which confront those engaged in accident prevention work are due to what we today term mistakes in the design and construction of buildings erected years ago.

Accident prevention enters into not only the operation of plant but into the very design and construction. Many accident hazards can be entirely eliminated if the building is designed and constructed with the proper consideration to this problem.

One of the most important points in constructing a manufacturing building is the provision for illumination. Artificial light, no matter how good, can never measure up to natural daylight.

News of All the Industry

Incorporations

The J. P. Gilman Granite Co., Kansas City, Mo., has been chartered with a capital of $30,000 by J. E. Wilson, Commerce building.

The Lime By-Products Corp., Charleston, W. Va., has been incorporated for $500,000 by M. F. Matheny, J. S. Horan, G. L. Hartley.

The Arkansas Valley Portland Cement Co., Florence, Colo., has been incorporated for $3,000,000 by R. G. H. Tallman, W. A. Hobson, D. A. Hessick.

The Leuders Building Stone Co., Fort Worth, Texas, has been incorporated for $12,000 by F. M. Johnson, A. C. Henderson, W. H. Henderson.

The Sparta Limestone Quarries, Inc., Sparta, Ill., has been incorporated for $8000 by T. A. Roussin, G. W. Bevington, N. R. Lessley, H. J. Holdoway, G. F. Eiker.

The Lima Quarries, Lima, N. Y., has been incorporated for $100,000 by F. McDonald, J. S. Crouse, W. Le Feber.

The Universal Gypsum Co., Rotan, Texas, has been chartered with a capital of $100,000 by C. E. Williams, L. Ford, J. V. Gray; was incorporated in Wilmington, Del.

The St. Charles Sand and Material Co., St. Charles, Mo., has been chartered for $25,000 by W. F. Achelpohl.

The Tuckahoe Stone Corp., East Chester, N. Y., has been incorporated for $50,000 by A. Bianchi, D. Beretta, J. Romeo. The attorneys are Clark, Close and Davis, White Plains, N. Y.

The Bantam Stone Co., Litchfield, Conn., has been incorporated for $50,000.

The Cream City Granite and Marble Co., Milwaukee, Wis., has been incorporated for $50,000 by A. C. Benzing, O. C. Bittermann, A. J. Benzing.

The Buchanan County Quarries Co., St. Joseph, Mo., has filed articles of incorporation and is capitalized at $10,000. Ten acres of limestone rock has been leased and a crusher will be in operation at the plant early in May.

O. H. and C. A. Wyant, Auburn, N. Y., have incorporated for $10,000, to operate a sand and gravel plant. The attorney is E. S. Mosher, Auburn.

The Tampa Bay Fertilizer Co., Tampa Bay, Fla., has been chartered with $1,000,000 capital, to manufacture fertilizer. S. W. Allen, president.

The Pennsylvania Granite Co., Dover, Pa., has been incorporated for $100,000.

The Serpentine Green Stone Co., Dover, Pa., has been incorporated for $100,000.

The Deer Island Granite Corp., Stonington, Maine, has been incorporated for $50,000. Officers: F. P. McGuire, president; Annie E. McGuire, treasurer, and P. T. Clarke.

The Farris Bros. & Hart Stone Co. has been incorporated in Los Angeles, Calif., for $50,000 by W. R. Farris, J. R. Farris, and F. M. Farris, Los Angeles; J. P. Hart, Burbank, Calif.

The Bonded Granite Co., Kansas City, Mo., has been incorporated for $10,000 by C. Hailey, E. J. Ryan and others.

The Linwood Cement Co. has been incorporated in Davenport, Iowa, for $2,000,000 by A. E. Horst, A. E. Carroll and others.

The Auto City Brick and Sand Co. has been incorporated in Port Huron, Mich., for $50,000 by J. W. Boyd, W. McAuley, and W. H. Morris.

The Lake Sand Corp., 133 West Washington street, Chicago, Ill., has been incorporated for $150,000 by M. Hausler, M. G. Hausler, Jr., F. Hausler, J. T. McDonough, E. M. Hausler, W. Hausler, C. C. Hausler, P. C. Darby, Ella Seip, L. Thornsen, and M. D. Wilson to manufacture and deal in silex, sand, gravel, lime, brick, stone, etc.

The Silver Springs Sand and Gravel Co., Silver Springs, N. Y., has been incorporated for $150,000 by G. O. Spaulding, E. D. Phillips, and W. M. Greveling. Attorney, W. M. Spaulding, Buffalo, N. Y.

The Blue Bonnet Lime Co., Fort Worth, Texas, has been incorporated for $6000 by D. D. Thompson, G. W. Harding.

The Utah Potash Corporation of Delaware, a $250,000 association organized in January, with shares at $10 par value, has filed a copy of its articles, naming F. M. MacCarthy, Marysville, Utah, process attorney; F. W. B. Schoradt, president, M. F. Babenzien, secretary, New York.

Sand and Gravel

The Prairie Sand and Gravel Co., Prairie du Chien, Wis., has been purchased by C. J. Knight and R. W. Whale, Waupaca. The plant will be remodeled, adding a complete washing, screening and loading plant. Five acres of gravel have been purchased and an option on 20 additional acres taken.

The Kansas Sand Co., Topeka, Kans., operating in the Kaw river, has installed a new loader in preparation for new business. The company's dredge, one of the most powerful on the river, is equipped with a 150-hp. engine pumping about 150 sq. yd. of sand an hour.

The Urbana Sand and Gravel Co., Urbana, Texas, is in the market for a 60-kw. generator, exciter, motor and auxiliary electric equipment.

The Mitylene Sand and Gravel Co., Albany, Ga., is planning improvements to its plant near Montgomery to increase its capacity 30 per cent.

The American Sand Co., Kansas City, Kans., operating a plant near Turner on the Kaw river will build two new sand plants, announces H. B. Thompson, president. Property has been purchased at Bonner Springs and Edwardsville. The plant at Bonner Springs will not be built until next spring. Spur lines will be run to both properties from the Union Pacific and the Bonner Springs interurban tracks.

The Milford Gravel Co., Kendallville, Ind., has purchased the William Francisco farm on the Blazed Trail, three miles east of Ligonier, and will operate a washed gravel plant there.

The Clarke Rock and Gravel Co., Los Angeles, Calif., recently incorporated for $100,000, has been organized. Directors: H. Freston, H. E. Bianchi and L. S. Farmer, Los Angeles. Attorney, Nolan, Rohe and Freston, 511 Pacific Finance building.

The Albany Gravello Co., Inc., Albany, N. Y., has erected a large sand and gravel washing and screening plant on the Van Rensselaer bank, North Albany. It produces 500 cu. yd. daily. Huge storage bins have been constructed, with concrete roadways leading to them.

The Casco Gravel Co., Casco Junction, Wis., expects to be running at full capacity shortly. It turned out 1414 cars of its product during 1922. With changes made to the plant it can now turn out more than 15 cars a day. Although a late start, due to bad weather, and sufficient orders ahead throughout the season, all previous records of the plant are expected to be broken.

The Kickapoo Sand and Gravel Co., Peru, Ind., has increased its capital stock from $20,000 to $50,000.

The Cowlitz Sand and Gravel Co., Kelso, Wash., is installing a gravel plant near here. Gravel will be taken from the Cowlitz river and screened and washed. Bunkers are under construction.

Lime

The Bone-Dry Lime Corp., Cassadaga and Fredonia, N. Y., has leased with privilege of buying the concrete block plant of Henry Cord, Fredonia. The plant will be used as a packing house for the package goods handled by the corporation.

The Grove City Limestone Co., Grove City, Pa., announced recently that the capacity of its plant is sold for some time. The material is used for road improvements.

The Pittsburgh Lime and Stone Co., Bellefonte, Pa., a subsidiary of the U. S. Steel Co., recently took a 6 months' option on the Mary Fisher farm, Penn Hall. The farm contains 150 acres and is highly productive. The holders of the option are after limestone that can be used in producing steel and iron. The same parties have already purchased the Ralph Shook and the John Bair farms, on the same section, and have made overtures for the Allison farm, also lying in the same vicinity.

The Pittsfield Lime and Stone Co., Pittsfield, Mass., has unfilled orders for 477 carloads of building lime, aggregating more than $250,000. As the Pittsfield plant is of only four kilns, it is compelled to place orders with other lime plants, and has for some time been taking the entire output of five lime plants. The company has orders for months ahead, according to local reports.

The Bromide White Lime Co., Kansas City, Mo., has increased its capital from $100,000 to $200,000.

The Elliston Lime Co., Elliston, Mont., is working at capacity to meet the demand for building lime, and has orders booked for six months ahead.

The Crystal Carbonate Lime Co., Louisiana, Mo., is in the market for crushing machinery and other equipment for a new plant.

The Hagerstown Lime and Chemical Co., Hagerstown, Md., has purchased the interests of J. S. Myers, who organized the company.

The Los Angeles Lime Co. is announcing to its patrons: "Way back in 1889 when we opened our doors we had a certain phone number which we have clung to all these years. Los Angeles has grown some since then and so has our business. Now it becomes necessary to install a new phone system and they have given us a new number: Main 2801. There are three lines on this new number and we hope you will call us often."

Quarries

The Kansas City, Mo., "Star" states the visit of Milwaukee railroad officials at Chillicothe has given rise that private interests may aid in the development of a large rock asphalt field in northern Carroll county. These men looked over the field as to the feasibility of building a spur from the main line. H. W. Graham, secretary of the local Chamber of Commerce, has been seeking to interest the state highway department in the deposit of road-building material. Tentative promises have been received that an analysis of the rock asphalt will be made later. The Carroll county field covers an area of five by six miles. The rock asphalt strata, according to preliminary tests, is 75 ft. thick, and an analysis of a sample exposed 40 years to the weather showed it to contain 8.7 per cent asphalt and 91.3 per cent sandstone.

The National Asphalt Refining Co. has been organized and incorporated in Jasper county to mine asphaltum on the A. Kaufman farm north of Richards, Mo. The company now is sinking a deep shaft. It will be mined along the same plan as coal, and the 27-ft. vein will be so worked and refined that it will produce not only asphalt for road building, but by an improved refining method all the by-products will be saved.

Cameron, Joyce and Co., Keokuk, Iowa, has closed a deal to purchase the rock quarry in Milan, and will install a commercial rock crusher soon. Part of the land was leased from the Greer estate for 10 years, and the balance, about 4 acres was purchased. The company intends building a spur track connecting its plant with the Q. O. & K. C. tracks.

The Woodstock Granite Quarry, Granite, Md., will resume work soon. A company has been incorporated with Thomas Murray, a Towson contractor, as president and manager, and William J. Peach, secretary and treasurer. Operation of the quarry was suspended in 1917.

The Midland Coast Rock Co., operating near Sisquoc, Calif., has increased its directorate to five members—Sam Hunter, president, W. P. Butcher, Jr., A. W. Belmont, F. J. Richards, and J. T. Degman.

The Champion Quarry, Stone City, Iowa, formerly operated by J. A. Green, is to be re-opened by Mr. Shaler of Cedar Rapids. A stone crusher will be installed and it will turn out material for concrete work.

The Rockport Granite Co., Rockport, Mass., has received the contract for furnishing 5000 tons of ballast at $1.75 per ton for the sea wall on Eastern avenue, Gloucester, Mass.

The Amargosa Talc Co. is having plans prepared for an addition to its factory at 224 Santa Fe avenue, Los Angeles, Calif.

Hecla Slate Co., New York, reports all the sanitary partitions, shower stalls, and urinals at the new Yankee Stadium and for enlargement of the Polo Grounds, New York, will be slate.

The Granite State Quarries Co., Concord, N. H., has bought the granite plant of the New England Granite Works and will operate it. The new corporation is headed by C. L. Jackmon as president, the other officers including E. S. Willis, vice-president, and G. A. Ledward, treasurer and general manager. The directors, with these officers, include J. E. Fernals, J. E. Tilton and S. Dunsford.

(Continued on page 56)

Cement

The Pacific Portland Cement Co., manufacturers of Empire and Reno plasters and Golden Gate portland cement, has moved its Los Angeles offices to 610 Chapman building, Eighth and Broadway. Theo. L. Wolters is the new branch manager.

The Yosemite Cement Co. has let the contract to the Hunt Engineering Co., Kansas City, Mo., for a cement plant at Merced, Calif., on the Merced river near the mouth of Jenkins Gulch.

The Lehigh Portland Cement Co. is installing a Clark dust-collecting system at its New Castle, Pa., plant to eleminate the present waste of limestone dust.

The Southwestern Portland Cement Co. will erect an office building in Victorville, Calif., one story and basement, 50x64 ft., to house its general offices, laboratory, and offices of superintendent and engineering department.

The San Antonio Portland Cement Co., San Antonio, Texas, has completed plans and will commence the construction of an addition to its mill for considerable increase in production. Willard E. Simpson is engineer.

The Atlas Portland Cement Co. has increased the wages of its employes 10 per cent in all departments at its Hannibal, Mo., plant. The company employs about 1500 men at Hannibal.

The Lehigh Portland Cement Co., Iola, Kans., will resume operations, announces C. A. Swiggett, superintendent. The plant was closed a month for its usual repair period. Work on the big smokestack has begun. It will be 289 ft. high and 12 ft. in diameter, costing about $20,000.

The New Egyptian Portland Cement Co., Port Huron, Mich., will install machinery at its new local mill, now nearing completion. A power house will be operated in connection with the plant.

Agstone

Canton, Ill.—J. R. Shinn, farm advisor, has returned from an elevator inspection and reports a contract has been made for 100 cars of limestone to be distributed through elevators to members of the Farm Bureau. It is hoped the amount will be doubled in use by members during this season. A contract for 100 cars was made at a considerable reduction. Those contemplating using a car load are requested to notify the Farm Bureau office. A stock of limestone will be kept for those wanting less than a carload. There is limestone at Canton, Ipava and Astoria, and in a few days there will be a quantity at Fairview.

Madison, Wis.—With the purchase of a lime grinding outfit by O. P. Noble of Glen Haven, County Agent J. B. Keenan of Grant county sees a great stride in the movement for greater use of lime by farmers of the county. "Cost of the lime is low, and the results are great," says Keenan. "The stone in some places where Noble is operating runs up to 100 per cent calcium carbonate. Our soils need lime. We should have more grinding outfits in the county."

William Stoppelworth, who is three miles east of Cross Plains, Wis., will move his portable grinder to the J. W. Kalscheur farm and begin grinding for Mr. Kalscheur and other farmers as soon as spring work eases up.

Lexington, Ky.—Limestone is to have a big part in soil improvement work in Grayson county this year, County Agent R. W. Searce, says. Orders already made call for 40 carloads of the material to be shipped this summer.

Potash

Eastern Potash Co., Raritan, N. J., receivers, announce plans for a reorganization of the firm whereby creditors will receive 100 cents on the dollar. A company will be organized to take over the firm's assets, giving creditors stock in the new company in payment of their claims against the company.

The Pennsylvania Drilling Co. is making extensive explorations of the subterranean deposits of potash near Stiles, Texas, preparatory to beginning mining operations. The extent of the deposit will be determined by drilling wells by the diamond-core method. The second well is now being drilled and work will start soon on another well three miles east. The potash underlies the surface at a depth of 800 to 1000 ft., and the strata have a thickness of 200 to 600 ft. According to analyses of samples the potash is of great richness.

Concrete Products

The Wizard Block Co., Elizabethton, Tenn., has been organized and is installing machinery to manufacture concrete blocks and bricks. J. Roberson and G. Smith, owners.

The Economy Concrete Co. of Virginia, J. S. Parrish, president, has contracted for a 100x160-ft. factory in South Richmond, Va., and will install rock crusher, concrete mixer, electric cranes, etc., and expects to be able to turn out two cars of decorative concrete stone daily.

The Interestate Concrete Co. has been incorporated in Fairbury, Neb., for $100,000. L. Nider, president and director; George Yant, vice-president; C. A. Ewers, secretary-treasurer.

The Glencoe Drain Tile Co. has been incorporated in Glencoe, Minn., for $25,000 to manufacture drain tile and other concrete products by J. J. Hankenson, J. Dibbs and others.

The Concrete Products Co. has been incorporated for $50,000 at Stemmers Run, Md., by M. T. Douglas, F. H. Hengemihle, H. W. Shenton.

The Loftis-Christofoli Tile Co. has been incorporated in Birmingham, Ala., to manufacture tile, terrazzo, marble and mosaic tile. V. P. Loftis, president and treasurer; E. H. Loftis, secretary.

The Watry & Hack Co. has been incorporated in West Allis, Wis., by L. Watry and C. Hack for $10,000 to manufacture concrete products.

The Southers Cut Stone Co. has been incorporated in Detroit, Mich., for $10,000 by E. Southers, M. R. Southers and E. M. Walton.

The Atlas Cement Products Co. has been incorporated in Aitkin, Minn., for $25,000 to manufacture and sell cement and concrete products.

The Acme Tile Mfg. Co., St. Petersburg, Fla., has been incorporated for $25,000. H. Forkel, president; R. Arnold, secretary-treasurer.

The Gibraltar Cement Block Co., Indianapolis, Ind., has a modern plant in operation. The main building is of frame construction, 45x50 ft. It is divided into 2 sections, the east 20x45 ft. and the west 30x45 ft. The steam boiler and cement storage rooms are in the east section. The cement storage room, 16x16 ft., has a capacity of two carloads, accessible by motor truck. The west section, with the exception of the office, is devoted to the construction of blocks. Three steam-curing chambers provide the features of the plant. Each one is 72x8 ft., with a height ranging from 5 to 8 ft. The 3 rooms are covered with a saw-toothed roof and are sealed with roofing paper and roofing felt. Steam is generated in a 40-hp. boiler at the east end of the plant. Blocks are cured in about 24 hr. There are two block machines, with a capacity of 1200 a day.

J. M. Caldwell has begun a concrete brick plant at Silverton, Ore. Mr. Caldwell has found gravel near Silverton which he can use profitably and that he can make brick in 38 colors.

Personal

Miss Claudia M. Sargent has been made New York district manager for the Charles Warner Co., Hugh McDonald, formerly in charge of this office having arranged to give more time to his private interests, although he will continue his identity with the company. Miss Sargent has been connected with the New York office for several years and prior to that time had several years' experience in the lime and dealers' supply business. She is probably the only district manager of her sex in the lime industry.

Frank Reith, formerly chief chemist of the Golden State Portland Cement Co., Oro Grande, Calif., will be the chemist and superintendent of the Cajon Lime Products Co., near Camp Cajon, Calif.

L. B. Gardner, traffic manager, Texas Portland Cement Co., Dallas, Texas, has been appointed to the advisory board of the car service division for the Southwestern district of the American Railway Association. G. C. Randall is district manager.

W. W. Fischer, president, Fischer Lime and Cement Co., with other prominent Memphis citizens, have organized to assist Clarence Saunders in marketing 50,000 shares of Piggly Wiggly stock.

R. L. Rowland, district engineer for the Portland Cement Association, Seattle, Wash., has resigned to enter the paving contracting field. Mr. Rowland has been associated with the association for the past 11 years except when he was with the marines in the World War. He is one of the best known men in the highway construction business. **Homer M. Hadley** will assume the duties of acting district engineer; he is an architect. After leaving the University of Washington he was chief architect in the offices of City School Architect F. A. Naramore. During the World War Mr. Hadley was an engineer in the Emergency Fleet Corp. He has been with the Portland Cement Association for the past two years.

Joseph W. Hays is completing the organization of a corps of consulting combustion engineers to be known as Joseph W. Mays and Associates. The headquarters will be Michigan City, Ind. He has found it impossible for some time to meet all of the demands upon his time and for this reason is forming the organization. The organization will be prepared to render consulting service in steam plants in all parts of the country. Every man in the organization will be a combustion expert of wide practical experience. No change will be made in the place of residence of any of these associates. Each will look after the engineering work in his immediate territory.

Manufacturers

The Dorr Co., engineers, announce that their New York office is now at the Park-Lexington building, 247 Park avenue. The Chicago office has been removed from 168 North Michigan avenue to Room 1132 First National Bank building, 20 South Dearborn street.

Trade Literature

Agitator Drives and Stirrers—A recent booklet of the New England Tank and Tower Co., Everett, Mass., calls attention to the distinctive features incorporated in the Nett-Co agitator drives and stirrers. "By improving the methods of agitation, operations can be speeded up, strict uniformity of products insured, and much valuable material and time saved," declares the company. "This is an age of specialization, and industries using stirring and mixing devices have justly demanded from the manufacturers modern, efficient, and thoroughly practical apparatus."

"Away from Methuselah" is the intriguing title of a unique booklet recently published by the Crescent Belt Fastener Co., 381 Fourth avenue, New York City. It takes the reader back to the first belt made by the Cave Man in prehistoric times and sketches in semi-humorous style, the development of belt-joining from that era right up to the present. The booklet is enlivened with amusing cartoons, and makes interesting reading, at the same time giving the reader a clear idea of the history of belt-joining. The last few pages of the booklet are devoted to a concise description of Crescent Belt Fasteners, with the whys and wherefores of the service they render.

Wood Pipe and Creo-Wood Flume—This catalog, just off the press, contains 248 pages, is profusely illustrated and has a great deal of hydraulic data, flow tables, and practical information to the hydraulic engineer or plant superintendent who may be confronted with hydraulic problems in the design and construction of water conduits, municipal water systems, hydroelectric developments, mining and sluicing operations, irrigation.

This catalog and handbook is the result of 30 years continuous gathering of data. The flow tables are based on formulas developed by U. S. Government engineers after exhaustive field tests on a large number of wood pipe and flume installations. There is also much information based on research work of the University of Washington and U. S. Forestry Service.

Dust Collecting—A loose-leaf folder of the Dust Recovering and Conveying Co., Cleveland, Ohio, describes the development of dust-collecting equipment, the early form of dust recovery and the cloth filtering process—all in Bulletin 1. No. 2 describes suction filters and their use in recovering smelter fumes; No. 4, the filter for gas filtration and general dust recovery, and No. 10 the Dracco dust-collecting system as applied to Raymond grinding mills. An interesting bulletin is devoted to the company's conveying installation, handling as coarse material as pebble phosphate rock and as fine as sand. The engineers have developed a new device which has made this handling easy, cheap and highly successful, says this bulletin.

Generators—The Westinghouse Electric and Mfg. Co. recently issued Leaflet 2390-A, describing the Type E engine-driven alternating-current generators. In this leaflet the construction of these generators from 50 to 3000 kv-a. is illustrated and described. They are said to be applicable to all prime movers, being suitable for direct connection to steam, gas, and oil engines, or slow speed horizontal water-wheels. The company has also issued Leaflet 3477-B, descriptive of the Hot Spot Indicator for transformers. The device is illustrated with photographs and wiring diagrams showing how the indicator functions and how it is located in the transformer.

Riveted Pressure Pipe—The American Spiral Pipe Works, Chicago, Ill., is distributing a folder calling attention to its 80-page Catalog No. 20, Taylor's spiral riveted pressure pipe. Appications of most interest to the rock products field are shown in an illustration wherein two lines of spiral riveted pressure pipe are at work—one supplying giants for washing down overburden of earth and the other for conveying the overburden from the pit.

"Concrete for Permanency"

QUALITY
BEAUTY
UTILITY
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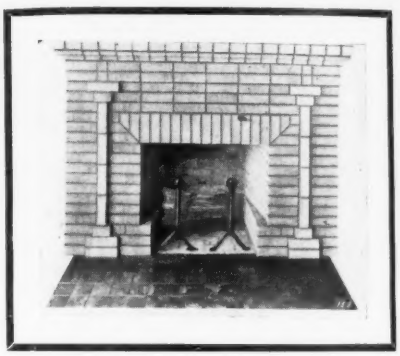
FIRE RESISTING

SHOPE BRICK



You are looking for a business proposition to sell your aggregate, surplus screenings, etc. Our object is to assist you to make this a head-liner instead of a tail-ender and often an absolute loss. For an illustration:

The great Homestake Mine located at Lead, South Dakota, is possibly the largest gold mine in the world (owned by the Hearst interests). This is free milling ore using several thousand stamps and only averages $2.75 per ton in gold from the grass roots to the 1200 foot level and is mined and milled at a handsome profit in this low grade ore.

Now then, a Shope Brick plant could take these tailings and make a larger profit than the Homestake Company does in extracting the gold, by manufacturing it into over fifty varieties of colors and finishes of Shope Brick.

Now if you have an available market, you have a gold mine. Let us tell you how to treat your ore. For a working example:

At the Portland plant last year we manufactured and sold 138,000 mantel brick and 10,000 square feet of hearth tile for these mantels. We consumed 383 tons of sand in its manufacture, netting us $38.40 per ton. This, of course, was only the notion department of annual production.

If you should become a Shope Brick manufacturer, you would be the only man in your territory who could sell Shope Brick. Every Shope Brick territory is guaranteed. Every Shope Brick licensee is protected by basic patents, giving him the exclusive monopoly.

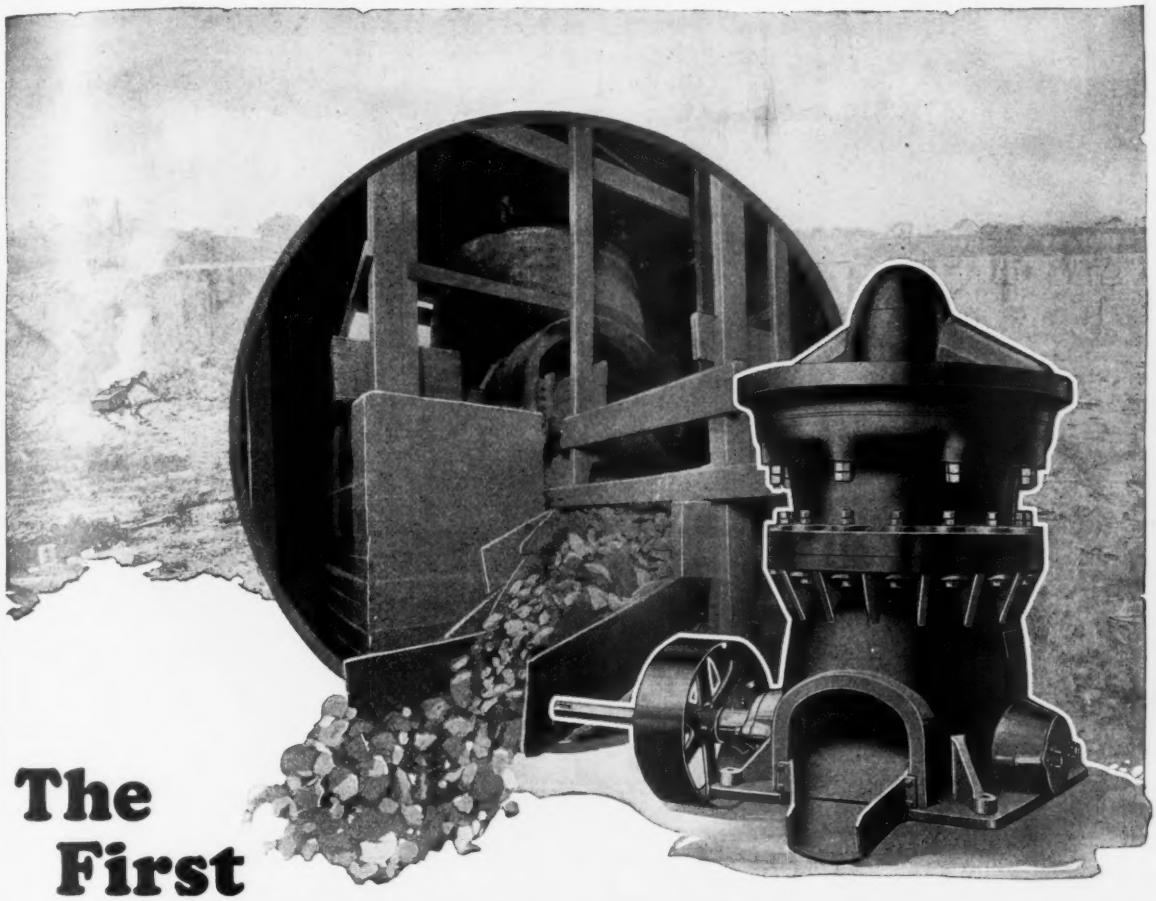
It will pay you to write for more complete information

Common Brick

SHOPE BRICK COMPANY

PORTLAND, OREGON

Face Brick



The First Superior McCully Crusher Bought in 1909

. . . and the success of the first sold three more

The Elmhurst Chicago Stone Company bought the first short shaft gyratory made by Worthington at the Power & Mining Works. This was in 1909. In 1912 they installed a duplicate. In 1914 another Superior McCully went into the same plant and in 1922 they installed the fourth Worthington gyratory. Every one of these crushers, excepting the first, was bought purely and solely on the basis of past performance, the way that you can buy crushers, too—if you get Worthington gyratories.

WORTHINGTON PUMP AND MACHINERY CORPORATION

Executive Offices; 115 Broadway, New York City. Branch Offices in 24 Large Cities

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Deane Works, *Holyoke, Mass.*
Blake & Knowles Works *East Cambridge, Mass.*
Worthington Works *Harrison, N. J.*
Laidlaw Works, *Cincinnati, Ohio.*
Hazleton Works, *Hazleton, Pa.*
Gas Engine Works, *Cudahy, Wis.*
Power & Mining Works *Cudahy, Wis.*
Snow-Holly Works *Buffalo, N. Y.*
Epping-Carpenter, *Pittsburgh, Pa.*

Buyers' Directory
of the Rock Products Industry

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AERIAL TRAMWAYS
Interstate Equip. Co., New York, N. Y.

AIR COMPRESSORS
Worthington Pump & Mach. Corp., New York City, N. N.

AUTOMATIC WEIGHERS
Richardson Scale Co., Passaic, N. J.
Schaffer Eng. & Equipment Co., Pittsburgh, Pa.

BAGS AND BAG MACHINERY
Jaite Co., The, Jaite, Ohio

BELTING
Robins Conveying Belt Co., New York City, N. Y.

BINS
Austin Mfg. Co., Chicago, Ill.
Brown Hoisting Machinery Co., Cleveland, Ohio.
Weller Mfg. Co., Chicago, Ill. (storage).

BELT FASTENERS
Crescent Belt Fastener Co., New York City, N. Y.

BIN GATES
Allis-Calmers Mfg. Co., Milwaukee, Wis.
Austin Mfg. Co., Chicago, Ill.
Brown Hoisting Machinery Co., Cleveland, Ohio.
Link-Belt Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Weller Mfg. Co., Chicago, Ill.

BRICK MACHINERY
Shope Brick Co., Portland, Ore.

BUCKETS—Elevator
American Manganese Steel Co., Chicago Heights, Ill.
Austin Mfg. Co., Chicago, Ill.
Brown Hoisting Machinery Co., Cleveland, Ohio.
Hendrick Mfg. Co., Carbondale, Pa.
Link-Belt Co., Chicago, Ill.

BUCKETS, GRAB
Brown Hoisting Machinery Co., Cleveland, Ohio.
McMyler Interstate Co., Cleveland, Ohio.

CABLEWAYS
Interstate Equip Co., New York, N. Y.
Link-Belt Co., Chicago, Ill.

CALCINING MACHINERY
Atlas Car & Mfg. Co., Cleveland, Ohio.
Butterworth & Lowe, Grand Rapids, Mich.

CARS—Quarry and Industrial
Atlas Car & Mfg. Co., Cleveland, Ohio.

CAR PULLERS
Link-Belt Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

CASTINGS
McGann Mfg. Co., Inc., York, Pa.

CEMENT MACHINERY
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Kennedy-Van Saun Mfg. & Eng. Corp., New York City.

CHAIN
Carroll Chain Co., Columbus, Ohio.
Link-Belt Co., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.

CLAMPS
Knox Mfg. Co., Philadelphia, Pa.

CLUTCHES
Dodge Mfg. Co., Mishawaka, Ind.
Link-Belt Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

CONVEYORS AND ELEVATORS
Austin Mfg. Co., Chicago, Ill.
Kennedy-Van Saun Mfg. & Eng. Corp., New York City.
Link-Belt Co., Chicago, Ill.
Smith Eng. Works, Milwaukee, Wis.
Robins Conveying Belt Co., New York City.
Sturtevant Mill Co., Boston, Mass.
Universal Road Mach. Co., Kingston, N. Y.

COUPLINGS
Knox Mfg. Co., Philadelphia, Pa.

CRANES—Crawler
Industrial Works, Bay City, Mich.
Link-Belt Co., Chicago, Ill.

CRANES—Locomotive
Byers Machine Co., Ravenna, Ohio.
Erie Steam Shovel Co., Erie, Pa.
Industrial Works, Bay City, Mich.
Koehring Co., Milwaukee, Wis.
Link-Belt Co., Chicago, Ill.
McMyler-Interstate Co., Cleveland, Ohio.
Ohio Locomotive Crane Co., Bucyrus, Ohio.
Orton & Steinbrenner, Chicago, Ill.
Osgood Co., The, Marion, Ohio.
Northwest Engineering Co., Chicago, Ill.

CRUSHERS AND PULVERIZERS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulverizer Co., St. Louis, Mo.
Austin Mfg. Co., Chicago, Ill.
Austin-Western Road Mach. Co., Chicago, Ill.
Buchanan Co., Inc., C. G., New York, N. Y.
Butterworth & Lowe, Grand Rapids, Mich.
Fuller-Lehigh Co., Fullerton, Pa.
Good Roads Machinery Co., Kennett Square, Pa.
K. B. Pulverizer Co., New York, N. Y.
Kennedy-Van Saun Mfg. & Eng. Corp., New York, N. Y.
Kent Mill Co., Brooklyn, N. Y.
Lewistown Fdry. & Mach. Co., Lewistown, Pa.
McLanahan-Stone Mach. Co., Hollidaysburg, Pa.
Morgan Engineering Co., Alliance, Ohio.
Munson Mill Machinery Co., Utica, N. Y.
New Holland Machine Co., New Holland, Pa.
Pennsylvania Crusher Co., Philadelphia, Pa.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Smith Eng. Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Universal Crusher Co., Cedar Rapids, Iowa.
Universal Road Mach. Co., Kingston, N. Y.
Webb City and Carterville Fdy. and Mach. Co., Webb City, Mo.
Williams Pat. Crush. & Pulv. Co., Chicago, Ill.
Worthington Pump & Mach. Corp., New York City, N. N.

CRUSHER REPAIRS—Manganese Steel
American Manganese Steel Co., Chicago Heights, Ill.

DERRICKS
American Hoist & Derrick Co., St. Paul, Minn.

DIPPER TEETH
American Manganese Steel Co., Chicago Heights, Ill.

DREDGING MACHINERY
Ellicott Machine Co., Baltimore, Md.

DRILLS
Sanderson Cyclone Drill Co., Orrville Ohio.

DRILLERS
Pennsylvania Drilling Co., Pittsburgh, Pa.

DRYERS
American Process Co., New York City.
Fuller-Lehigh Co., Fullerton, Pa.
Lewistown Fdy. and Mach. Co., Lewistown, Pa.
McGann Mfg. Co., Inc., York, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

DUST COLLECTING SYSTEMS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

ENGINES—Steam
Morris Mach. Works, Baldwinsville, N. Y.

ENGINEERS
Buckbee Co., J. C., Chicago, Ill.
Hunt, R. W., & Co., Chicago, Ill.
Richard K. Meade & Co., Baltimore, Md.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

EXCAVATORS—Dragline Cableway
Link-Belt Co., Chicago, Ill.
Sauerman Bros., Chicago, Ill.

EXPLOSIVES
Hercules Powder Co., Wilmington, Del.

FROGS AND SWITCHES
Central Frog & Switch Co., Cincinnati, Ohio.

GAS PRODUCERS
Morgan Construction Co., Worcester, Mass.
R. D. Wood & Co., Philadelphia, Pa.

GEARS
Dodge Mfg. Co., Mishawaka, Ind.
Link-Belt Co., Chicago, Ill.

GLASS SAND EQUIPMENT
Lewistown Fdy. & Mach. Co., Lewistown, Pa

Buyers' Directory

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Classified Directory of Advertisers in this issue of Rock Products

GRINDING MILLS
Munson Mill Machinery Co., Utica, N. Y.

GRIZZLIES
Robins Conveying Belt Co., New York City.

HOISTS
American Hoist & Derrick Co., St. Paul, Minn.
Austin Mfg. Co., Chicago, Ill.
Hyman-Michaels Co., Chicago, Ill.
Link-Belt Co., Chicago, Ill.
Thomas Elevator Co., Chicago, Ill.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

HOSE APPLIANCES
Knox Mfg. Co., Philadelphia, Pa.

HYDRATING MACHINERY
Atlas Car & Mfg. Co., Cleveland, Ohio
Kritzer Co., The, Chicago, Ill.
Meade & Co., Richard K., Baltimore, Md.
Miscampbell, H., Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Toepfer & Sons Co., W., Milwaukee, Wis.

HYDRAULIC DREDGES
Morris Machine Works, Baldwinsville, N. Y.

INSULATION
Celite Products Co., Chicago, Ill.

LIME HANDLING EQUIPMENT
Link-Belt Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

LIME KILNS
McGann Mfg. Co., Inc., York, Pa.
Meade & Co., Richard K., Baltimore, Md.
Vulcan Iron Works, Wilkes-Barre, Pa.
Worthington Pump & Mach. Corp., New York City, N. N.

LIQUID FUEL EQUIPMENT
W. N. Best Furnace & Burner Corp., New York, N. Y.

LOADERS AND UNLOADERS
Brown Hoisting Machinery Co., Cleveland, Ohio.
Erie Steam Shovel Co., Erie, Pa.
Link-Belt Co., Chicago, Ill.
Orton & Steinbrenner, Chicago, Ill.

LOCOMOTIVES
Baldwin Locomotive Works, The, Philadelphia, Pa.
Davenport Locomotive Works, Davenport, Iowa.
Fate-Root-Heath Co., Plymouth, Ohio.
Hadfield-Penfield Steel Co., Bucyrus, Ohio.
Ironton Engine Co., Ironton, Ohio.
Lima Locomotive Works, New York, N. Y.
Milwaukee Locomotive Mfg. Co., Milwaukee, Wis.
Vulcan Iron Works, Wilkes-Barre, Pa.
Whitcomb Co., Geo. D., Rochelle, Ill.

MANGANESE STEEL
Hadfield-Penfield Steel Co., Bucyrus, Ohio

MILLS (Grinding, Etc.)
Fuller-Lehigh Co., Fullerton, Pa.
Hardinge Co., New York City.
Kent Mill Co., Brooklyn, N. Y.
Munson Mill Mach. Co., Utica, N. Y.
Sturtevant Mill Co., Boston, Mass.

PAINT AND COATINGS
Williams, C. K., & Co., Eaton, Pa.

PERFORATED METALS
Cross Eng. Co., Carbondale, Pa.
Hendrick Mfg. Co., Carbondale, Pa.

PLASTER MACHINERY
Butterworth & Lowe, Grand Rapids, Mich.

PORTABLE CONVEYORS
Austin Mfg. Co., Chicago, Ill.
Link-Belt Co., Chicago, Ill.

PUMPS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Manganese Steel Co., Chicago Heights, Ill.
Emerson Pump and Valve Co., Alexandria, Va.
Morris Machine Works, Baldwinsville, N. Y.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Worthington Pump & Mach. Corp., New York City, N. N.

PULLEYS
Dodge Mfg. Co., Mishawaka, Ind.
Weller Mfg. Co., Chicago, Ill.

PULVERIZED FUEL EQUIPMENT
Raymond Bros. Impact Pulv. Co., Chicago, Ill.

QUARRY EQUIPMENT
Universal Road Mach. Co., Kingston, N. Y.

ROAD MACHINERY
Austin-Western Road Mach. Co., Chicago, Ill.

ROPE, WIRE
American Steel & Wire Co., Chicago, Ill.
Leschen, A., & Sons Co., St. Louis, Mo.

SAND SETTLING TANKS
Good Roads Machinery Co., Kennett Square, Pa.

SCALES
Richardson Scale Co., Passaic, N. J.

SCRAPERS, DRAG
Austin-Western Road Machinery Co., Chicago, Ill.
Link-Belt Co., Chicago, Ill.
Sauerman Bros., Chicago, Ill.

SCREENS
Austin Mfg. Co., Chicago, Ill.
Austin-Western Road Mach. Co., Chicago, Ill.
Cross Eng. Co., Carbondale, Pa.
Hendrick Mfg. Co., Carbondale, Pa.
Lewistown Fdy. and Mach. Co., Lewistown, Pa.
Link-Belt Co., Chicago, Ill.
New Holland Machine Co., New Holland, Pa.
Robins Conveying Belt Co., New York City, N. Y.
Smith Eng. Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
W. Toepfer & Sons Co., Milwaukee, Wis.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Twin City Iron & Wire Co., St. Paul, Minn.
Tyler Co., The, W. S., Cleveland, Ohio.
Universal Road Mach. Co., Kingston, N. Y.
Weller Mfg. Co., Chicago, Ill.

SEPARATORS
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.
Tyler Co., The W. S., Cleveland, Ohio.

SEPARATORS, MAGNETIC
Buchanan Co., C. G., Inc., New York, N. Y.

SHEAVES
Dodge Mfg. Co., Mishawaka, Ind.
Weller Mfg. Co., Chicago, Ill.

SHOVELS—Steam, Electric and Gas
Brown Hoisting Machinery Co., Cleveland, Ohio.
Erie Steam Shovel Co., Erie, Pa.
Northwest Engineering Co., Chicago, Ill.
Orton & Steinbrenner Co., Chicago, Ill.
Osgood Co., The, Marion, Ohio.

SPROCKETS AND CHAIN
Link-Belt Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

STEEL PLATE CONSTRUCTION
Hendrick Mfg. Co., Carbondale, Pa.

STORAGE BINS
Austin Mfg. Co., Chicago, Ill.
Austin-Western Road Mach. Co., Chicago, Ill.
Brown Hoisting Machinery Co., Cleveland, Ohio.

TANKS, STEEL STORAGE
Traylor Eng. & Mfg. Co., Allentown, Pa.

TESTING SIEVES AND SHAKERS
Tyler Co., The W. S., Cleveland, Ohio

TRACK EQUIPMENT
Central Frog & Switch Co., Cincinnati, Ohio.

TRAMWAYS
Interstate Equip. Co., New York, N. Y.

TRANSMISSION MACHINERY
Link-Belt Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

VALVES
Knox Mfg. Co., Philadelphia, Pa.

WASHERS, SAND AND GRAVEL
Lewistown Fdy. and Mach. Co., Lewistown, Pa.
Link-Belt Co., Chicago, Ill.
Smith Eng. Works, Milwaukee, Wis.

WIRE ROPE
American Steel & Wire Co., Chicago, Ill.
Leschen, A., & Sons Co., St. Louis, Mo.

WIRE CLOTH
Cleveland Wire Cloth Co., Cleveland, Ohio.
Twin City Iron & Wire Co., St. Paul, Minn.
Tyler Co., The W. S., Cleveland, Ohio.

The ROBINS 20 ft. PORTABLE

$527.00 F. O. B. Passaic, N. J.

A Troughed Belt Conveyor—No Skirt-Boards

This makes it possible to handle sand, gravel, crushed stone, and other abrasive materials without damage to the edges of the belt.

Features:

16" Troughed Belt, large carrying capacity.

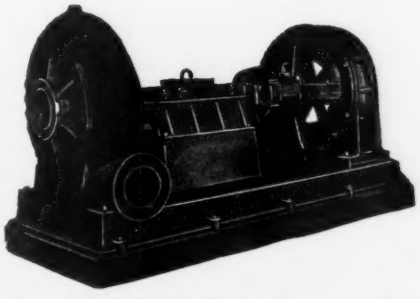
Self-cleaning arched frame, fully protecting the return belt from dirt accumulation.

Rugged construction, well balanced.

Power—2 H.P., A.C. motor, 2 or 3 phase, 60 cycle. If equipped with 5 H.P. "NEW-WAY" Engine—$81.00 additional, f. o. b. Passaic.

Robins Conveying Belt Company

New York Chicago Boston Pittsburgh



Heavy Service Dredging Pump

Where conditions are too severe for our standard sand pump, the above type is recommended.

It is built in sizes from 4 in. up, arranged for belt, motor, or engine drive.

MORRIS MACHINE WORKS

50 Genesee St. Baldwinsville, N. Y.

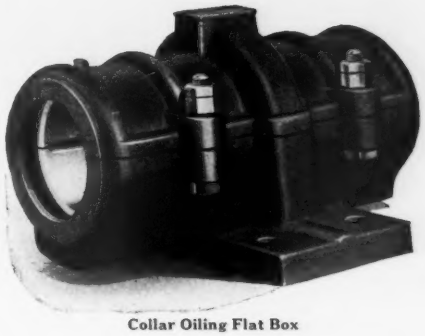
39 Cortlandt St., New York City
Forrest Bldg., Philadelphia, Pa.
217 N. Jefferson St., Chicago, Ill.
Penobscot Bldg., Detroit, Mich.

Bulletin No. 19-B fully describes our complete line of sand and dredging pumps. Have you your copy?

MORRIS

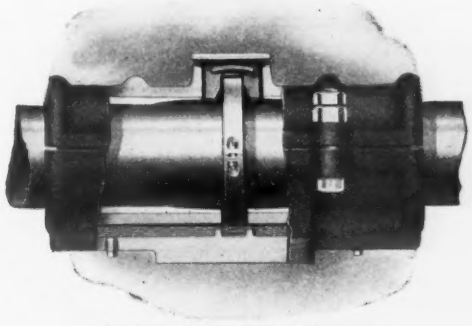
Since the Civil War Builders of Centrifugal Pumps, Hydraulic Dredges, and Steam Engines

Lubrication Is Positive Economical and Safe



Collar Oiling Flat Box

Reduce lubrication expense in your operation by using bearings of the type shown.



Sectional View of Collar Oiling Box

Building a complete line of reliable power transmission machinery, we offer the services of our engineers to help solve your transmission problems and request the opportunity to quote on your requirements. With our splendid facilities there is no inquiry too small for our careful attention nor too large for us to handle.

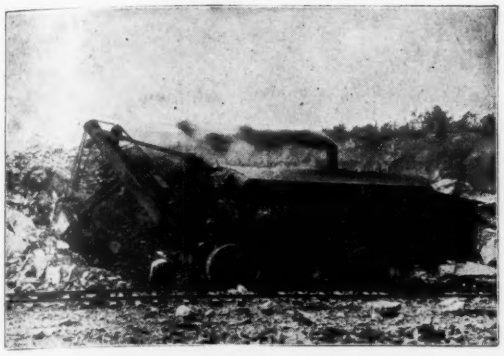
ALLIS-CHALMERS

MANUFACTURING COMPANY

ELECTRICAL MACHINERY
STEAM TURBINES — STEAM ENGINES
HYDRAULIC TURBINES
GAS ENGINES — OIL ENGINES
MINING MACHINERY
CRUSHING AND CEMENT MACHINERY
FLOUR AND SAW MILL MACHINERY

PUMPING ENGINES
CENTRIFUGAL PUMPS
CONDENSERS
AIR COMPRESSORS — AIR BRAKES
STEAM AND ELECTRIC HOISTS
AGRICULTURAL MACHINERY
POWER TRANSMISSION MACHINERY

MILWAUKEE, WISCONSIN. U.S.A.



Osgood 43—1½ yd. on Traction Trucks

OSGOOD
THE GOOD STEAM SHOVEL

for Pit or Quarry use—where a machine must stand up under the most severe usage—and still produce results quickly and economically. Watch an Osgood work. Note its speed and snappy action. Our Bulletins sent upon request.

The OSGOOD Company
Marion, Ohio, U. S. A.

Reduce Material-Handling Costs

1. When the cost of common labor began to rise the American Splint Corporation decided to install a Type E "INDUSTRIAL" Crane to handle and pile logs into tiers 45 ft. high.
2. Three men and the Crane now do this work which formerly required twelve.
3. Daily cost is $19.17 with the Crane, against $75.60 for the twelve men, under low wages. The saving is $56.43 a day, or $16,929.00 for 300 working days.
4. "This convincing proof of the savings made prompted us to order a second or duplicate Crane which we found as convenient and economical as the first," says Paul N. Hayes, Vice-President and General Manager of the American Splint Corporation.

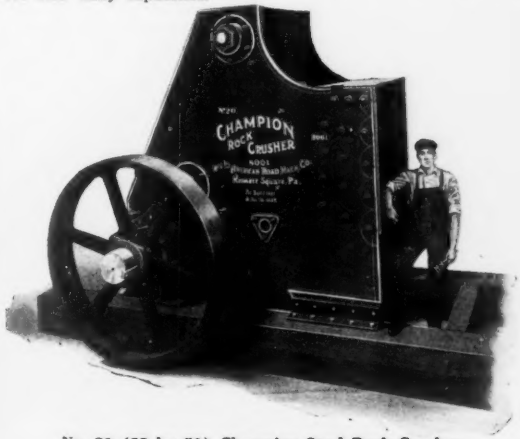
Write for our illustrated Catalog No. R-109

INDUSTRIAL WORKS
BAY CITY, MICHIGAN

Thirty Two Years Ago

The First Champion Crusher Was Built

Since that time more than 6,000 crushers have been sold and users are to be found in every country in the world. The Champion is a slow speed, steel frame crusher, with a large capacity and low upkeep cost. Made in many sizes from 50 to 1000 tons' daily capacities.

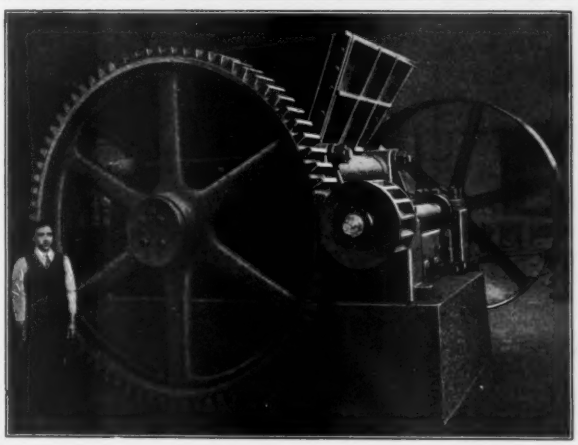


No. 20 (22 by 50) Champion Steel Rock Crusher

We design, build and install complete crushing outfits of any size desired. We specialize in the building of Elevators, Screens, and Conveyors of any desired capacity.

Ask for catalogue, "Champion Crushing and Quarrying Machinery." It is free.

THE GOOD ROADS MACHINERY CO., INC.
1203 Tower Building, Chicago, Ill.
Kennett Square, Pa.



If you had seen the McLanahan Single Roll Crusher before ordering your first Gyratory or Jaw Crusher, you would now be running only the McLanahan Crushers.

After many years' practical experience building and operating other crushers, we brought out the first Single Roll Crusher, proved it best, simplest and most economical—making least fines—requires but little head room—no apron or hand feeding—takes wet or slimy material.

Capacity, 5 to 500 Tons Per Hour

McLanahan-Stone Machine Co.
Hollidaysburg, Pa.
Screens, Elevators, Conveyors, Rock Washers, Etc.

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Type ads only. No cuts or illustrations permitted unless at the regular display advertising rates. Please send check with order. These ads must be paid for in advance of insertion

FOR SALE

1 Sturtevant No. 2 Duplex Ring Roll Mill, with $1000 worth of repair parts. $5,000

1 6x60′ Rotary Dryer, complete. Perfect condition. $3,000

1 8x100′ Rotary Kiln.

2 New Allis-Chalmers Dryers, complete, 7′ hot end reduced to 5½′ at feed end, 60′ over all.

1 5½x22′ New Tube Mill, complete. $2,300

1 4x16′ good as new Tube Mill, complete. $1,000

1 5x9′ New Allis-Chalmers Tube Mill, complete. $1,200

2 33″ Fuller Mills, each, $1,000

1 No. 3 Universal Williams Mill. $800

1 No. 2 Regular Williams Mill. $600

1 Williams No. 2 Deck Sweeper. $1,000

2 12 Ton 36″ Gauge Porter Saddle Tank Locomotives. Each, $1,500

1 300 H.P. Allis Engine, battery of three 150 H.P. Casey-Hedges Boilers.

1 Vulcan Iron Works Hoist, Drum 5x5′, complete. $1,250

THE EQUIPMENT SALES COMPANY

Independent Life Building **Nashville, Tennessee**

Wire us your requirements at our expense—"If we don't have it we will get it"

NEW AND REBUILT MACHINERY

13—Large Blowers, each direct connected to Vertical Steam Engine—Brand New
1—Temple-Ingersoll Electric Air Drill, complete
6—Blake Type Jaw Crushers
10—Sets Geared Crushing Rolls
19—New 7½x10-inch Dake Steam Winches
2—New Anchor Windlasses (Suitable for use as Heavy Duty Hoisting Engines)
6—Horizontal Slide Valve Steam Engines—40 to 90 HP.
3—Corliss Steam Engines—75 to 200 HP.
1—30 HP. Muncie Oil Engine
1—100 HP. Nordberg Oil Engine
1—50 HP. Mogul Oil Engine
1—24-in. Gauge Milwaukee Gasoline Locomotive
1—42-in. Gauge Whitcomb Gasoline Locomotive
1—No. 3 Williams Swing Hammer Mill
2—No. 4 Williams Swing Hammer Mills
1—No. 48 American Ring Pulverizer
1—3½ ft. x 8 in. Hardinge Conical Ball Mill
1—"Billow" Fuel Oil Pumping and Heating Unit (Duplex)
20—1½ in. to 8 in. Centrifugal Pumps
50—1 in. to 7 in. Steam Pumps
1—4x6-in. Deane Triplex Double Acting Pump

MACHINERY & SUPPLY CORPORATION

Dept. 27 **JOPLIN, MO.**

1—50-ton standard gauge Brooks 6-wheel switcher.
1—28-ton standard gauge Shay geared locomotive.
2—9x14″ 36″ gauge 4-wheel saddle tank locomotives.
1—14-B Bucyrus steam shovel, mounted on traction wheels.
2—18-ton O&S bucket handling locomotive cranes.
30 Miles 56-lb. relay steel rails; Hawkinsville, Ga.
30 Miles 50-lb. and 56-lb. relay steel rails; Percy and Webb, Miss.

Birmingham Rail and Locomotive Company

Birmingham **Alabama**

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25′, 3½x25′, 4x30′, 5½x50′, 6x60′ and 7x60′; double shell dryers, 4x20′, 5x30′ and 6x35′; steam-heated air rotary dryers, 4x30′ and 6x30′.

KILNS—Rotary kilns, 4x40′, 5x50′ and 6x70′, 6x100′, 7x80′ and 8x110′.

MILLS—6x8′, 6x5′, 5x4′, 3x3½′ pebble and ball mills; 3′ March mill; 42″, 33″ and 24″ Fuller-Lehigh mills; 4½x20′, 5x11′, 5x20′, 5½x22′ and 6x20′ tube mills; 7½x13″, 9x15″, 16x10″ and 12x26″ jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 24″, 36″ and 40″ cage mills; 3′ and 4½′, 6′ and 8′ Hardinge mills; 18x12″, 20x12″ and 30x10″ roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 5 roll and 2 roll No. 1 and No. 000, No. 00 and No. 0 Raymond mills; one No. 3 and No. 4 and No. 7½ Telsmith breaker; one 36″ Sturtevant emery mill; one 3 roll Griffin mill; 60″ chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; 6x8′, 6x5′ and 4x3′ Newaygo vibrating screens; Richardson automatic scales; 8′ and 10′ Emerick air separators.

Air compressors.

W. P. Heineken, Engineer

95 Liberty Street, New York. Tel. Cortland 1841

FOR SALE

Sand Lime Brick Machinery

One Four Mold Boyd Press
One Abbe Engineering Co. TUBE MILL—spiral feed
One Sturtevant ROTARY LIME CRUSHER
Eighty Steel Cars—capacity 850 Brick each
One Air Blower, 24″ diam. "American"

For full description and prices, address

Winchester Granite Brick Co.

Dudley, Ky.

MOTOR FOR SALE

30 H.P., 3 phase, 60 cycle, 440 volt, 40 degree rise, 1150 R.P.M., Allis Chalmers. First class condition. Price $350.

The Hamilton Gravel Co.

Hamilton, Ohio

WANTED

Steam Shovel—about 1 yard dipper. Consider purchase. Must be first class condition and bargain price, otherwise not interested. Submit complete specifications.

International Silica Company

Cairo, Ill.

FOR SALE

STEAM SHOVEL, ⅝ yard Vulcan, in first-class condition. Attractive price for quick sale. Also one 12-ton 36-inch Gauge American Saddle Tank Locomotive.

The Wilmington Crushed Limestone Co.

Melvin, Ohio

Have you a plant for sale? Do you wish to purchase a plant? Are you in need of a superintendent or manager? Are you looking for a position as plant superintendent or manager? Advertise your wants in these columns for quick results.

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Type ads only. No cuts or illustrations permitted unless at the regular display advertising rates. Please send check with order. These ads must be paid for in advance of insertion

IMMEDIATE SHIPMENT

Austin No. 3 and No. 4 Gyratories
Bonnot 5x22 ft. Tube Mills
Vulcan 8x100 ft. Rotary Kilns
Vulcan 6x120 ft. Rotary Kilns
Ruggles-Coles 5x30 ft. Dryers
Hardinge 4½ ft. x 16 in. Ball Mills
Hardinge 8 ft. x 22 in. Pebble Mills
Link-Belt 20 ton Coal Crusher

Following Sturtevant Crushers:
Jaw; 12x26 in.; 6x20 in.; 2x6 in.
Roll; 36x16 in.; 20x14 in.; 12x12 in.; 8x5 in.
Rotary, No. 00, 1, 2, 3
Ring Roll; No. 1, 2, 2-Duplex
Raymond Kent & Fuller Mills
Swing Hammer Mills, all makes
Crushers of all types and sizes

High Grade New and Used Machinery for the Entire Rock Products and Non-Metallic Mineral Industry Our Specialty

American Machinery Equipment Company — **Charlotte, North Carolina**

SPECIAL BARGAINS

Send Us Your Boiler Inquiries

66x86 in. TRAYLOR JAW CRUSHER.
25-50-80-110 HP. Elec. Hoists.
Nos. 4-5-6-7½-9 and 10 CRUSHERS.
6 and 12 ton Gasoline Locomotives.
2—DISC CRUSHERS, 36 in. SYMONS, also 28 in.
100-TON, 2⅛ yd. ELECTRIC SHOVEL.
50-5000 ft. Steam Belt and Electric Compressors.
13x30 in.; 10x18 in.; 8x14 in. JAW CRUSHERS.
24x54 McLANAHAN ROLL CRUSHER.
50 HP. P. D. D. HOIST, 440 V., 3 Ph. Motor Dragline Set; also 25 HP. Outfit.
NEW G. E. Gas Engine Sets, 5 and 25 Kw., 125 V.
NEW 1000 Gpm. Cent. Pump, 231 ft. head—"STANDARD UNDERWRITERS"—Motor—440 V., 60 Cy., 3 Ph.
2—1000 Gpm. Underwriters Steam Pumps, 100 lb.
NEW No. 5 GYRATORY CRUSHER (MICHIGAN).

Send us inquiries for your wants

Ross Power Equipment Company
Indianapolis, Ind.

FOR SALE

2—16 in. x 8 ft. 8 in. belt feeders complete with steel frame, gears, countershaft and drive pulley.

1—42 in. x 12 ft. pipe strut revolving screen with beveled gear drive.

2—66 ft. pan elevators, 24x9x11¾ buckets, complete with drive.

1—No. 9 American Sirocco Fan.

All f. o. b. Maple Grove, Ohio.

The Dolomite Products Co.
1110 Euclid Ave., Cleveland, Ohio

FOR SALE

75 hp. 2 speed Thomas electric dragline hoist. Good as new.

No. 5 and No. 2 Allis Chalmers gyratories. Good shape.

Island Sand & Gravel Co.
Columbus, Ohio

FOR SALE

One 14x18 Erie Automatic Tangy Engine, one heater and 50 ft. of 4½" piping.

The North Indiana Brick Co.
Michigan City, Indiana

FOR SALE

1—Second hand D. C. generator, 30 KW, 240 amperes, 125 volts, connected direct to a 56 h.p. balanced valve steam engine; in A-1 condition.

1—Second hand 60 h.p. Putnam automatic cut-off steam engine; in A-1 condition.

1—Second hand Dey time register in weather and dust proof cabinet, for fifty employees; in first class order. Price $20.00.

New Holland Machine Company
New Holland, Pa.

FOR SALE

No. 5 Gates Gyratory Style D Crusher.
No. 6 Gates Gyratory Style D Crusher.
Two Climax No. 2—9x16-in. Jaw Crushers.
70 H. P.—13x16-in. Erie City Steam Engine.
22x48-in. Hardie Tynes Corliss Steam Engine, complete.
Two G. E., 150 H. P. Motors, Voltage 220-240.
Worthington Steam Pump, 10x8-in.; 20-in. cylinders.
Two No. 0 Thew ⅝-yard bucket steam shovels mounted Standard Railroad Trucks.
Sanderson Cyclone No. 14 Well Drill, complete.

E. W. COOPER
174 Third Ave. N., Nashville, Tenn.

Mine Cars, Rails and Ties

We have mine cars in stock for all purposes. Also rails 12 lb. to 100 lb. section. Spikes, bolts, frogs and switches. All trade is solicited and prices cheerfully quoted.

M. K. FRANK
Frick Building — **Pittsburgh, Pa.**

Symons Disc Crusher

24-inch size. Minor repairs will make like new. Price $650.

The Hamilton Gravel Co.
Hamilton, Ohio

FOR SALE OR RENT

Steam Shovels on Crawlers

1—37 Marion, No. 4771, equal to new.
2—20-B Bucyrus, Nos. 3723 and 3725, used two weeks.
2—Type "B" Erie.

Pittsburgh Machinery & Equipment Co.
1302 Fulton Bldg., Pittsburgh, Pa.

ROTARY DRYERS

Thirty New Direct Fired Rotary Dryers, 4 ft. — in. diameter, 30 ft. long

These Dryers were about to be put into operation as the armistice was signed, and consequently were never used. We are offering them at a sacrifice, complete with driving mechanism, furnace irons, grates, etc. Some are equipped with steam radiators for steam heated air drying.

McDERMOTT BROS. CO.
Allentown, Penna.

CRUSHERS

No. 2 Day Pulverizer
7x12 Blake Jaw Crusher
10x15 Austin Jaw Crusher
No. 4 Gates Gyratory

LOCOMOTIVES

12 ton Porter, 36 in. ga., cyl. 9x14
10 ton Shay, geared, 36 in. ga., built 1920, excellent condition

DUMP CARS

8—1 yd., 30 in. ga., Atlas V-shape
10—1½ yd., 24 in. ga., Western
12—1 yd. 36 in. ga., Koppel V-shape
10—4 yd., 36 in. ga., Western
25—2 yd., 30 in. ga., Sq. Body Quarry Cars, steel, incline end dump

Rails, Cars, Locomotives

Mid-Continent Equipment & Machinery Co.
Security Bldg. — **St. Louis, Mo.**

FOR SALE

One Atlas Loader, in good condition. Owing to the erection of a new plant this loader is idle. Will be sold at a bargain. Can be seen at our works at

Wisconsin Rapids, Wis.

WISCONSIN RAPIDS SAND & GRAVEL CO.

For Sale—STEAM SHOVEL

⅝ YD. THEW "O" TRACTION

Thoroughly rebuilt; attractive terms for quick sale.

Walter A. Zelnicker Supply Co., St. Louis
Rails, Locomotives, Cars, Tanks, Pipe

Classified Advertising

Rates for advertising in the Classified Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Type ads only. No cuts or illustrations permitted unless at the regular display advertising rates. Please send check with order. These ads must be paid for in advance of insertion

An Opportunity for an Experienced Sand and Gravel Man Who Has Some Capital

About ten miles from Asheville, North Carolina, a growing city and on the Southern Railway and a hard surfaced road leading to Asheville, with ample water for washing, cleaning and separating the sand and gravel. I control about 150 acres of this deposit, running from a depth of 8 feet to a maximum of 27 feet deep, and averaging more than 15 feet deep all over this acreage.

Outside of supplying the city of Asheville, there is an opportunity of selling the state and county gravel and sand for road building.

I understand it will not be expensive to put in the equipment needed to handle the plant. I would like to put in the property on a fair basis to some experienced man who will put in the equipment.

I will be very glad to give any information desired to anyone who will write me care Paris Medicine Company, Beaumont and Pine Sts., St. Louis, Mo., E. W. Grove.

WANTED

General foreman for Lime Plant operating with steam shovel. State age, salary, experience and when available. References. Permanent position for capable man. Address

Box 1660, care of Rock Products
542 South Dearborn St., Chicago, Illinois

Southern Negro Labor Supplied

Advance orders taken. Correspondence invited.

PARKER & CO.
309 East 42nd Street, Chicago

George Borrowman, Ph.D.
CHEMIST

Analyses, consultations, researches in connection with rock products, cements, clays, lime, plasters, zeolites, sands, etc.

9 So. Clinton St. Chicago, Ill.

WANTED

Man capable of managing 3-plant gravel operation. Splendid opportunity for competent man to make desirable connection with small investment. Address

Box 1662, care Rock Products
542 South Dearborn Street, Chicago, Ill.

For Sale, Rent or Lease

On a royalty, a modern, equipped, ground limestone crushing and pulverizing plant with 30 acres of a 30 ft. ledge of the highest testing blue limestone in Southern Ohio. No lack of business. A good local trade; plant now in operation, but am unable to manage it on account of my age and health. A fine location for a larger plant with no chance for opposition. Call on or address at once

FRANK SHARP
Lynchburg, Ohio

WANTED

Manager or superintendent for granite quarry and crushing plant; must be thoroughly familiar with drilling and blasting. Primary breaker 36x42 inches jaw crusher. Steam power. House supplied free. Advise experience and pay expected. A good man wanted to increase production.

Neverson Granite Quarry, Sims, N. C.

Superintendent Wanted for Rotary Kiln Lime Plant—Capacity 100 Tons Daily

Mail applications, with detailed information, regarding past experiences, connections and recommendations to

THE MARBLE CLIFF QUARRIES CO.
Hartman Building Columbus, Ohio

WANTED

Quarry superintendent. A hard worker would be more appreciated than one who possesses all the knowledge that is possible to be acquired in the rock products industry. Address

Box 1657, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

Position Wanted

First class executive with thorough practical knowledge of the erection and operation of crushing and lime plants, is open for position as manager or superintendent, taking full charge. Now employed but desires change. Location anywhere. Excellent references.

Address Box 1636, care of Rock Products
542 South Dearborn Street Chicago, Illinois

Position Wanted

By competent plant and quarry manager or superintendent. Was superintendent for 7 years of the limestone quarries for a large cement plant. Since 1914 have been manager of a large granite quarry and crushing plants. Familiar with all details from drilling and blasting to the mechanical end. References furnished. Address

Box 1664, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

FOR SALE

Complete Rock Crushing Plant, including quarry equipment, 250 H. P. Steam Power Plant, buildings, tools, extras, etc. Located on railroad in Pennsylvania. Equipped for manufacture of roofing granules. Capacity 10 tons per hour. In first-class condition. For full particulars address

W. C. B., Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

WANTED

Lime shed foreman. Duties—in charge of men loading bulk lime, filling barrels and sacking hydrate. Under direction of superintendent. Must have ability to handle men. Central west location. Address

Box 1661, care of Rock Products
542 South Dearborn St., Chicago, Illinois

SUPERINTENDENT

of long experience, one who possesses a thorough and practical knowledge of efficient quarrying methods. Experienced in limestone and trap rock and accustomed to handling extensive operations. Seeks connection with progressive company. Prefer location in East or Central West. Interview solicited.

Box 1659, Care of Rock Products
542 South Dearborn Street, Chicago, Illinois

H. E. WIEDEMANN
(Est. 1905)
Consulting and Analytical Chemist

Specialist in Analysis of Rock Products
Chemical Bldg. St. Louis

WANTED

General superintendent for a large, new lime and stone crushing plant with steam shovel operation, about Oct. 1, 1923. Address

Box 1658, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

Position Wanted

By crushing superintendent with mechanical ability, construction and designing. Do not carry inflated organization. I have always produced good results. Open for position at once. Good references. Address

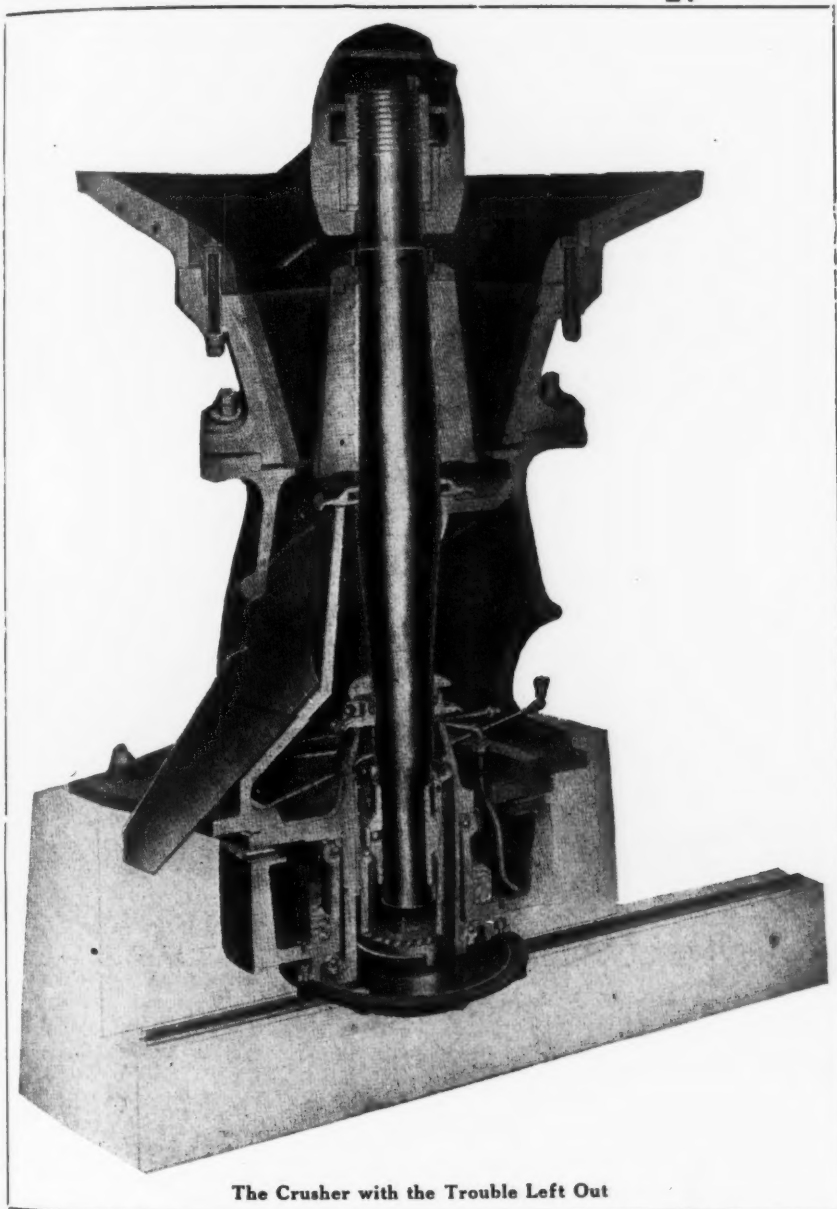
Box 1663, care of Rock Products
542 South Dearborn Street Chicago, Illinois

For prompt and satisfactory results in buying or selling a plant securing help or a position, use the Classified Department of ROCK PRODUCTS

INDEX TO ADVERTISEMENTS

KENNEDY *GEARLESS* CRUSHERS

The Kennedy has revolutionized the rock crushing industry. It represents a definite step in advance, and is unquestionably the best, strongest, and most efficient unit known to rock crushing engineering.



The Crusher with the Trouble Left Out

Points of Superiority

1. Less Power Consumption
2. Low Operating Cost
3. Continual Operation —Not Limited to Safe Gear Speed — Strikes a Harder Blow, and Has Increased Capacity
4. Perfected Dust Proof Circulating Oiling System.
5. Can Be Set in Any Position—And Takes Less Room
6. Equipped with Patented Ball and Socket Eccentric.
7. Noiseless.

Parts Eliminated

1. Outboard Bearing
2. Counter Shaft
3. Inner Bearing Cap
4. Base, and Support
5. Thrust Ring
6. Pinion
7. Gear
8. Key for Gear
9. Two Steel Wearing Rings
10. Bronze Wearing Rings.

Parts Added

1. Set Balls
2. Ball Race Rings
3. Ball Retainer.

This improvement has actually reduced cost of maintenance 80%, not including head and concaves.

Write for Catalogue and Information

Kennedy Van Saun Mfg. and Eng. Corp.

50 Church St., New York

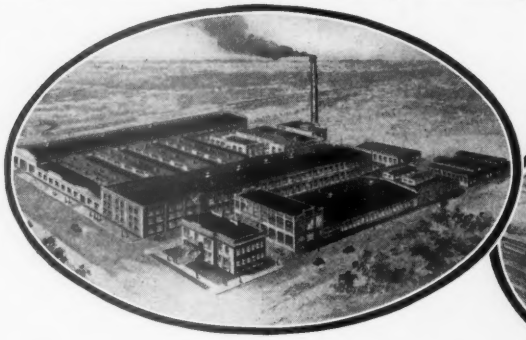
Compagnie Des Entreprises Industrielles
40 Rue des Mathurins, PARIS

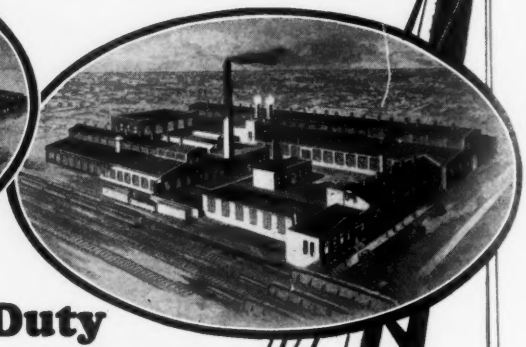
Harron Rickard & McCone, Inc., San Francisco and Los Angeles

When writing advertisers please mention ROCK PRODUCTS

KOEHRING

Crane Excavators, Draglines, Shovels





Koehring is the Heavy Duty Word in Excavating Machinery

THE oversize design in every detail — the rigid, inflexible principle of uncompromised workmanship, the absolute exclusion of anything but the highest standard engineering and mechanical practice— *these* are Koehring qualities that become more and more valued in year-after-year trouble-free performance and low maintenance in the face of punishing service. The more you know about Koehring construction, the more you will discover that Koehring means "Heavy Duty."

Crane Excavator Capacities

No. 1 Capacity: Equipped with 35′ boom. Handles ¾ yard bucket at 28′ radius; lifting capacity at 12′, 14,000 lbs. 4 cylinder 5″x6″ gasoline engine.

No. 2 Capacity: 12 tons at 12′ radius. ½ yard clamshell bucket loaded with sand or gravel at 45′ radius. ¾ yard clamshell bucket loaded with sand or gravel at 40′ radius. 1 yard clamshell bucket loaded with sand or gravel at 35′ radius. 1½ yard clamshell bucket loaded with sand or gravel at 25′ radius. 1 yard Page drag bucket on a 40′ boom.

No. 3 Capacity: 20 tons at 12′ radius. 1 yard clamshell bucket loaded with sand or gravel at 50′ radius. 1½ yard clamshell bucket loaded with sand or gravel at 40′ radius. 2 yard clamshell bucket loaded with sand or gravel at 35′ radius. 1½ yard Page drag bucket at 40′ radius.

Write for Bulletin CR 29.

Reg. U. S. Pat. Off.

KOEHRING COMPANY
MILWAUKEE, WISCONSIN

Manufacturers of Cranes Draglines, Shovels, Concrete Mixers.

SALES OFFICES, SERVICE WAREHOUSES IN PRINCIPAL CITIES

Foreign Dept., Room 1370, 50 Church Street, New York City.

Canada, Koehring Company of Canada, Limited, 105 Front Street East, Toronto, Ontario.

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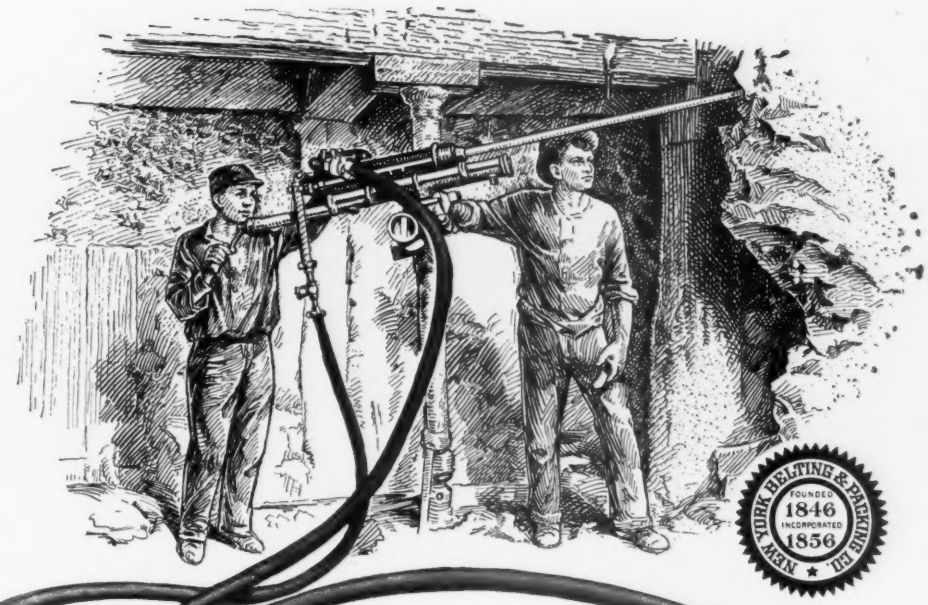

Getting More Work From Your Drills

ONLY when your drills are backed by a steady flow of air at full pressure is it possible to obtain maximum production.

Because of certain definite qualities built into Indestructible Air Drill Hose, its use on your drills will assure uninterrupted driving power.

The great strength of the hose is but one of several features. It is guarded against expansion and kinking by a specially woven fabric jacket over which the rubber cover is applied. This also makes for flexibility which is appreciated when working in close quarters. Short bends will not kink it—you cannot blow it out with many times the average working pressure.

Your drills will remain continuously on the job—with production correspondingly increased—because the air keeps coming.

NEW YORK BELTING & PACKING CO.

Rubber Goods for the Rock Products Industry

New York Boston Chicago Philadelphia
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INDESTRUCTIBLE AIR DRILL HOSE

The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Entered as second-class matter, July 2, 1907, at the Chicago, Illinois, Postoffice, under the Act of March 3, 1879.

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Volume 26 June 2, 1923 Number 11

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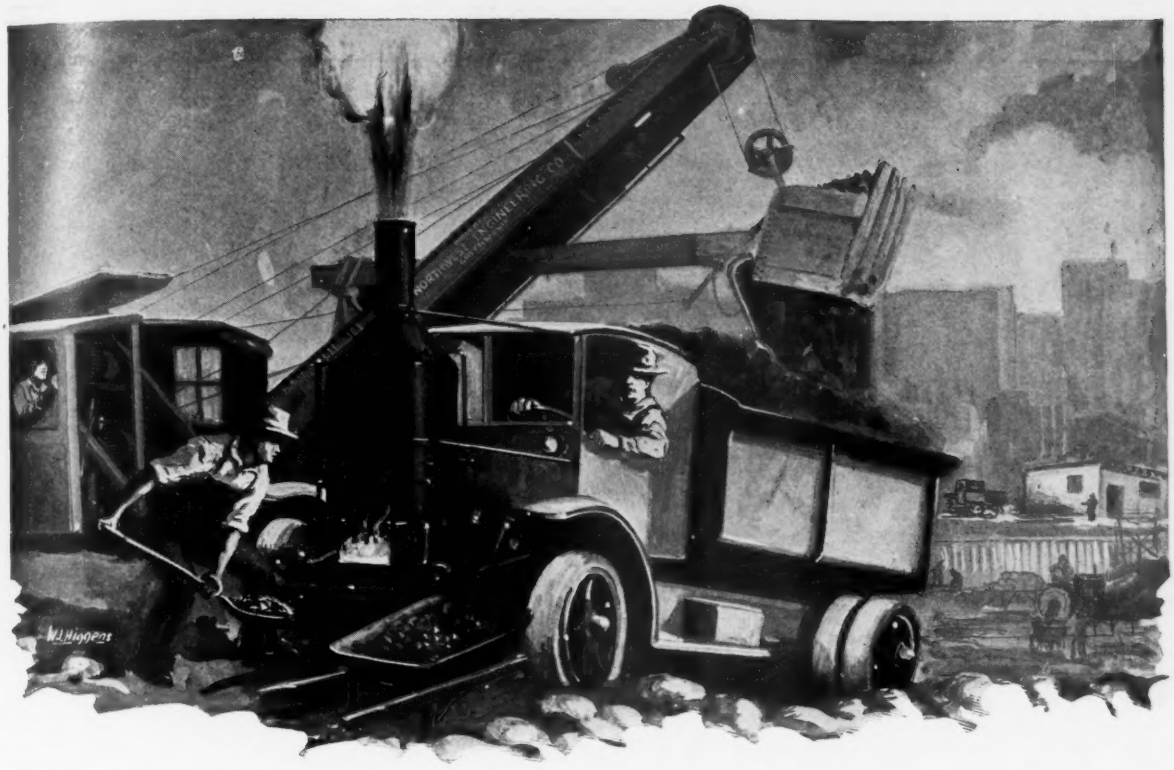

Would you run your truck with a steam engine?

Think of it! The idea in itself is preposterous! Imagine an upright steam engine built on a truck chassis, a wheel barrow of fuel at each end of the desired run, hand firing and waiting for steam, to put up with, to say nothing of the high cost of coal and the overtime the operator would have to put in every morning and evening making and drawing fires—just as he does on your shovel. You don't stand for this sort of thing on your trucks—then why stand for it in your shovels and cranes.

Your trucks give you an even flow of flexible, low cost, trouble-free power sufficient to do the desired work; there are no boosters or auxiliary engines to push it over the high spots—and this is exactly what you secure in the Northwest, a Gas shovel, fully powered, free from auxiliary engines—an easily handled unit that does away with overtime, the raking and making of fires and the other troubles of steam. Get truck efficiency from your shovels.

Ask a Northwest owner—

NORTHWEST ENGINEERING CO.
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GAS SHOVEL

CRANE
DRAGLINE
SHOVEL

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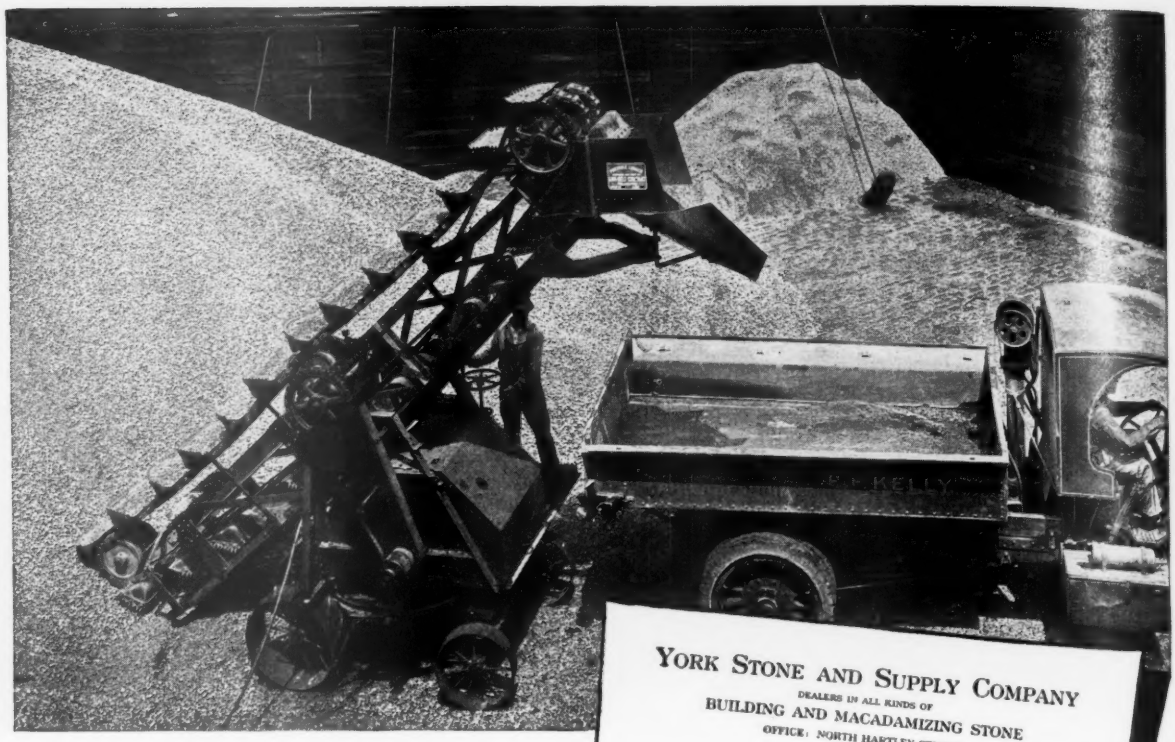

Loads 2100 Tons Cost $10.00

Half a cent a ton!

That's loading—economically.

In these days of rising costs—and prices—can you do better than put a Link-Belt Power Swiveling Loader to work for you?

Read the letter from the York Stone & Supply Co. Then write us—if you are interested in loading any material from ground to trucks or wagons.

YORK STONE AND SUPPLY COMPANY
DEALERS IN ALL KINDS OF
BUILDING AND MACADAMIZING STONE
OFFICE: NORTH HARTLEY STREET

York, Pa. Feb. 21st, 1923.

Link-Belt Company,
Nicetown, Philadelphia,
Pa.

Gentlemen:-

It affords me pleasure to write you a few lines relative to the ability and economy of your Link-Belt Power Swiveling Loader.

We had in stock on the first of April, 1922, upward of 15,000 tons of crushed stone stored, and in our busy season for three successive days this machine handled 700 tons daily.

All material was loaded on trucks, and the operation was confined to a one-man operation.

The cost, plus the current consumed, when the machine was recently overhauled, was less than $10.00 for handling the above material.

This machine has answered our purpose in every respect, and should you at any time have a customer whose conditions are similar to ours, and care to refer him to us, the best we could do is speak well of this type of loader.

Yours truly

YORK STONE & SUPPLY CO.

Manager

1216

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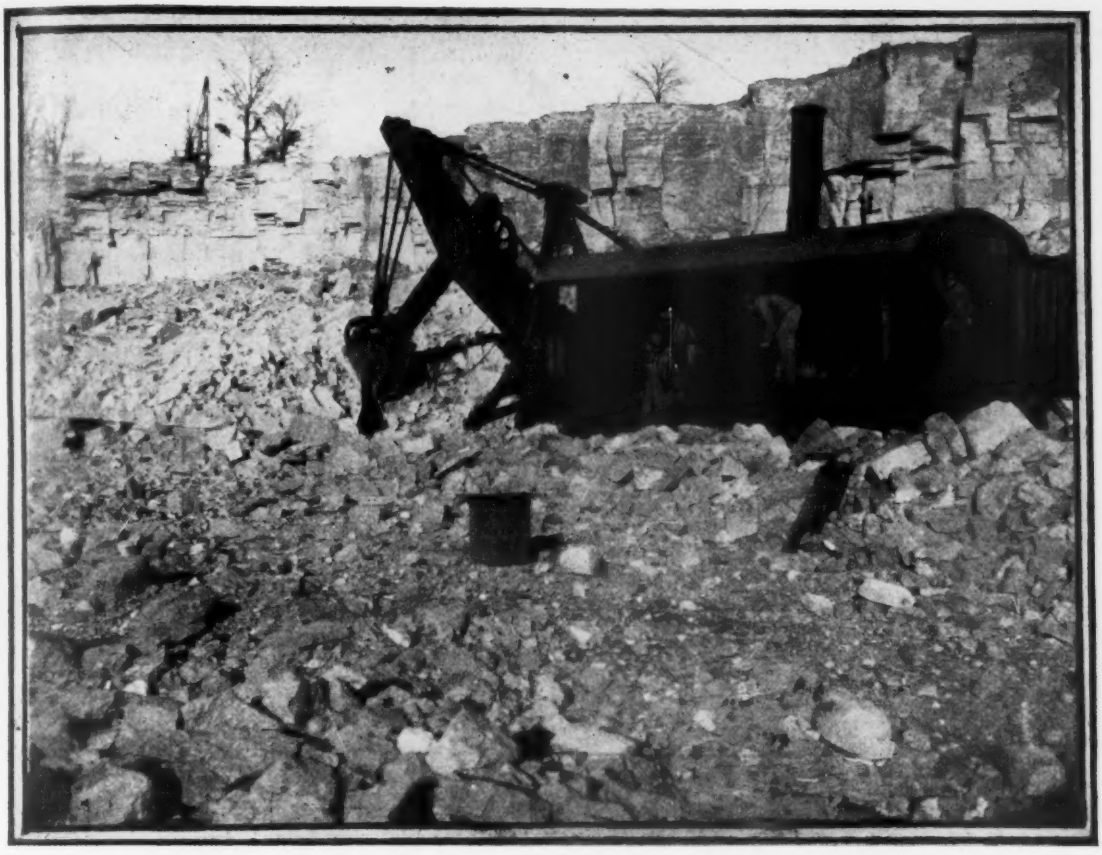

Digging Gold Dollars

Biggest demand ever known for quarry products—keep the shovels working! Time is money now!

Select the grade of Grasselli Explosive best suited to your conditions and your shovels can work faster and turn out a bigger day's production.

The right Grasselli Explosive invariably speeds up quarrying—it insures a good, clean job.

Write our branch nearest you for the quick helpful service of a Grasselli field man.

The Grasselli Powder Company

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ESTABLISHED 1839 CHEMICALS ZINC GRASSELLI EXPLOSIVES DYESTUFFS

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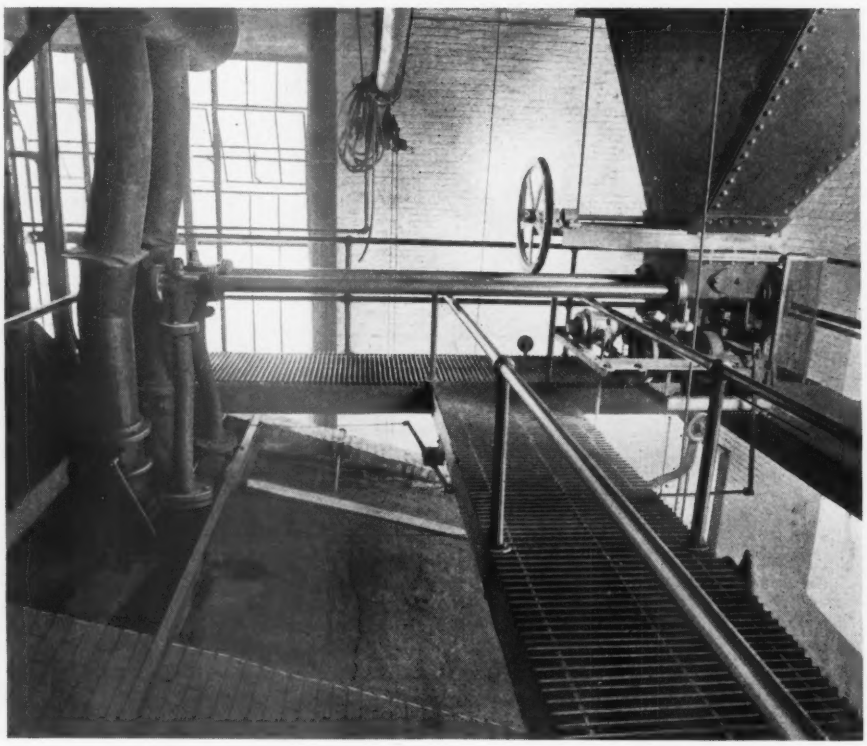
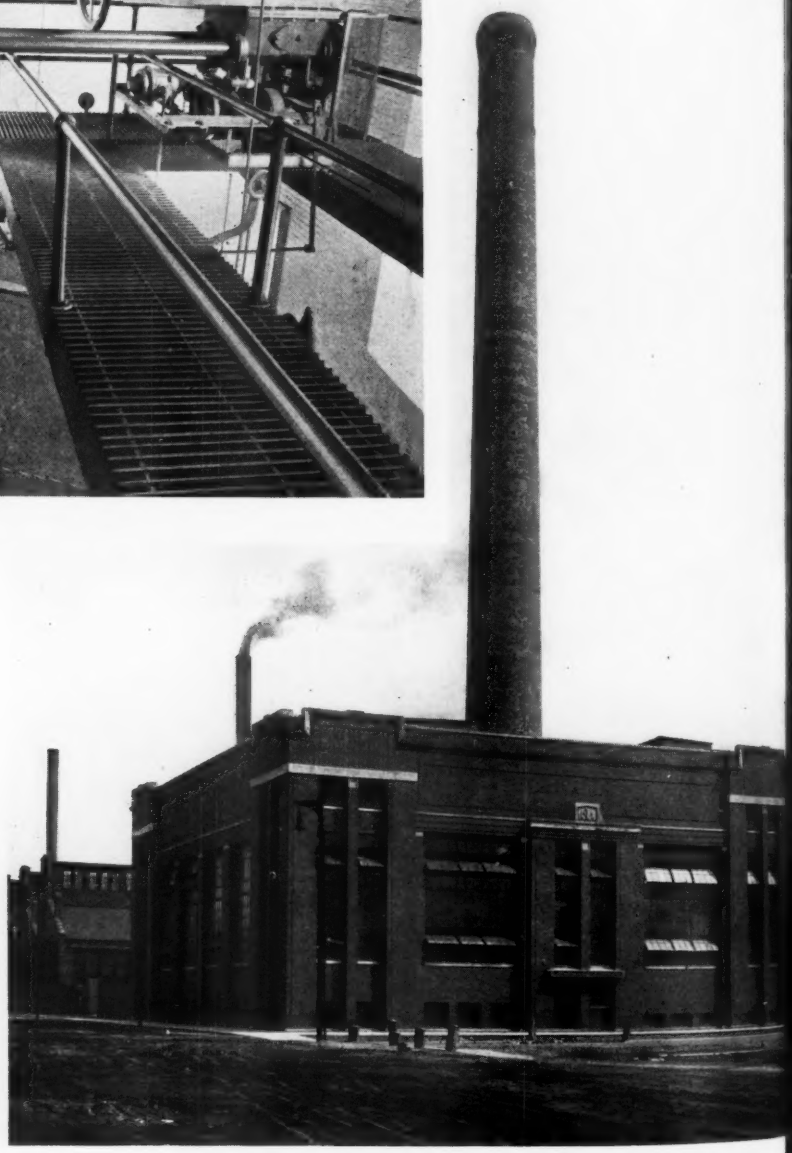
Powdered Coal



The Rayco Pulverized Coal System of firing, used in this power plant of a large malleable iron company, affords smokeless combustion and fuel economy.



Rayco feeders and low pressure burners used on the two boilers in the above power plant.

Powdered Coal has been used for years in the Cement Industry and with great economy to the Cement Companies. But have you thought of the latest use for this fuel?

In your boiler plant!

There will be greater savings obtained in the use of pulverized coal in boiler plants in the next few years than was ever produced by any other equipment developed for the efficient burning of coal.

Powdered Coal has been tried in boilers a number of times during the past thirty years but no really successful installation was made until the last three or four years, during which time quite a number of plants have been installed. All of which are in successful operation today, producing economies that were never thought possible.

Powdered Coal is applicable to small plants as well as large ones, and large economies can be obtained in both. Probably the largest economies will be obtained by industrial concerns with small boiler houses for generating power.

In these small plants it has been impossible to get good efficiencies because of their size and the many points at which losses could occur. Powdered Coal in these small plants will automatically reduce these losses.

Consider the following factors in connection with your boiler plant and we believe you will realize the value to you of investigating powdered coal as a fuel.

Almost any grade of coal can be used with equally good results—a saving in first cost.

Invariably a greater evaporation is obtained per pound of coal, which means greater efficiency—a saving that cannot be ignored.

Standby losses are practically eliminated and starting-up time is cut in half —a saving of more coal.

Fluctuations in your load can be taken care of almost immediately.

Higher ratings can be carried. For example, if you had five boilers, four would carry the load, allowing the fifth for additional power when it is needed. Many present plants requiring additional power, could install powdered coal on existing boilers and obtain it.

The cost of equipping with Powdered Coal is no more than with modern stokers and in many cases is less.

Labor requirements are no more, and strange to say, operators welcome the use of fuel in this form.

Raymond Roller Mills grind the coal at a low cost and Rayco equipment distributes, feeds and burns it.

Preliminary figures will be gladly furnished on your boilers.

Write for "Rayco Pulverized Coal Systems."

RAYMOND BROS. IMPACT PULVERIZER CO.
RAYMOND BROS. ENGINEERING CO.
1301 North Branch Street, Chicago

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Church St.
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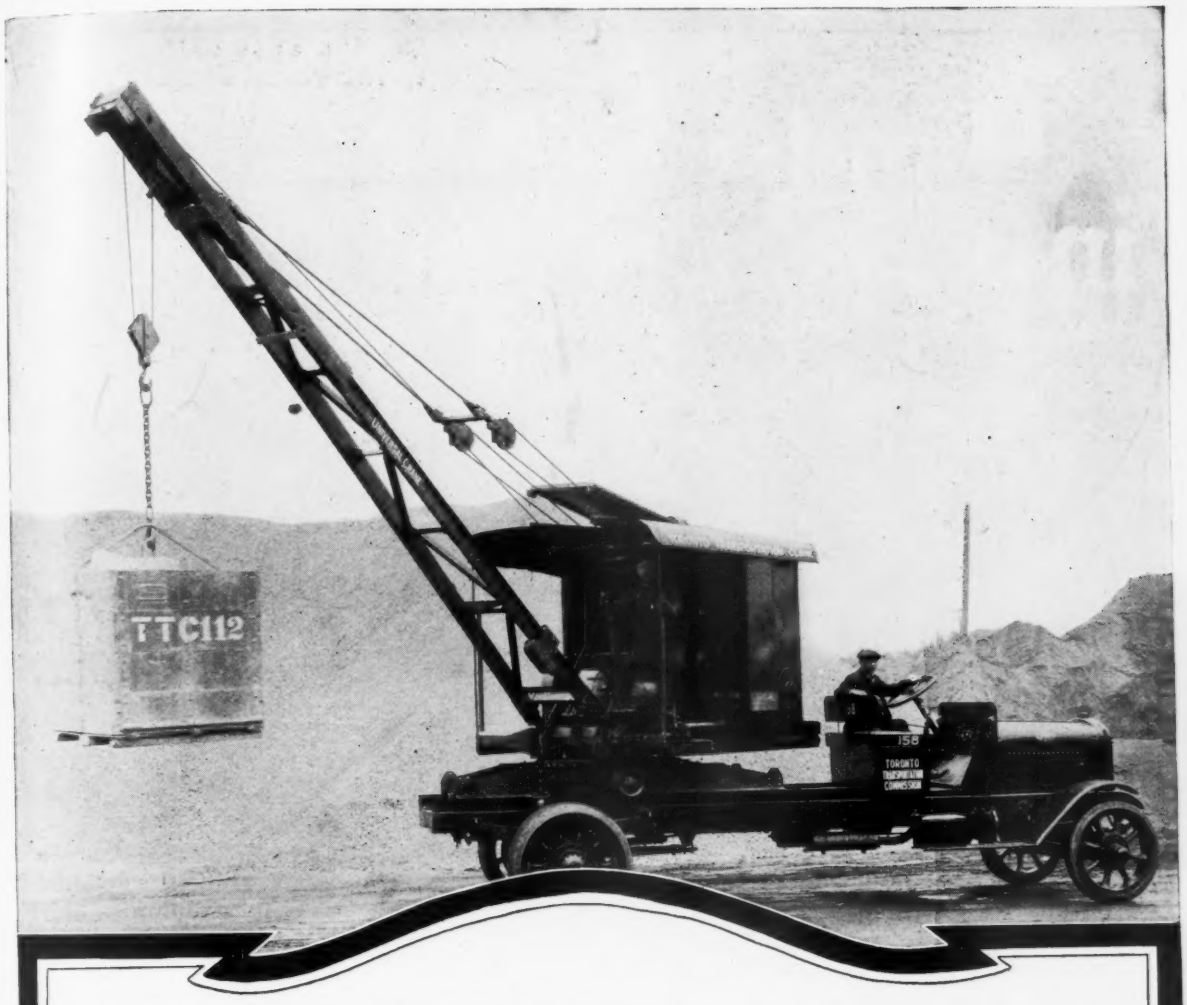

The Universal Crane Company, like many other important crane manufacturers want you to know exactly the make and grade of wire rope you get with their equipment. For this reason they use

WILLIAMSPORT WIRE PATENTED TELFAX MARKED ROPE

As standard equipment on their cranes.

Where you find a manufacturer using Williamsport Wire Rope as standard equipment, you may feel assured this manufacturer wants you to have the best equipment that money can buy and he wants you to KNOW you are getting it.

Williamsport is the only wire rope made, the grade of which can be identified without a laboratory test. Why take a chance with unmarked ropes on hazardous operations. Send for our interesting booklet MWR which every wire rope user should have.

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Handy in Crowded Quarters

A "FORD" in the Pump Field

An Evinrude is at its best in close quarters — where other power pumps cannot be used.

AN Evinrude Centrifugal Pump does efficient work at low cost under conditions that foil heavier, bulkier power pumps. It requires no "installation"—works with or without a suction line. In fact, an Evinrude may be lowered right into the ditch, caisson or excavation and submerged in the water. Pumps 5,000 gallons an hour at a 20 foot head.

Motor and pump are built into one handy compact unit weighing only 115 lbs. No gears, belts or chains — the pump is driven direct by the motor so no power is lost. Pump passages are unobstructed — free from sliding parts, valves and levers. Motor is the same dependable 2 H. P. gasoline engine now used in 160,000 Evinrude rowboat motors.

Scores of industries use Evinrude Pumps. Disposes of drainage water in quarries, gravel pits, mines and building excavations. Empties coffer dams for bridge builders, pumps water to their hoisting engines. Aids street railway and public service companies in their underground work. Pumps flooded basements for fire departments. Ideal priming outfit for sand dredge pumps.

If you need a pumping outfit of the Evinrude capacity, send for illustrated literature—completely describes Evinrude features and uses.

DEALERS: Industrial and building activity makes this a big pump year. Some desirable territory still available. Write today for our proposition.

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70 LAKE STREET, MILWAUKEE, WIS.

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5000 GALLONS per hour at 20 ft. head

EVINRUDE CENTRIFUGAL PUMP

For users requiring a more powerful pump the Evinrude No. 1½ is recommended. 7400 gallons per hour at a 20-ft. head —3½ h.p. Evinrude motor. Price $175.

Price: $150.00 F.O.B. MILWAUKEE

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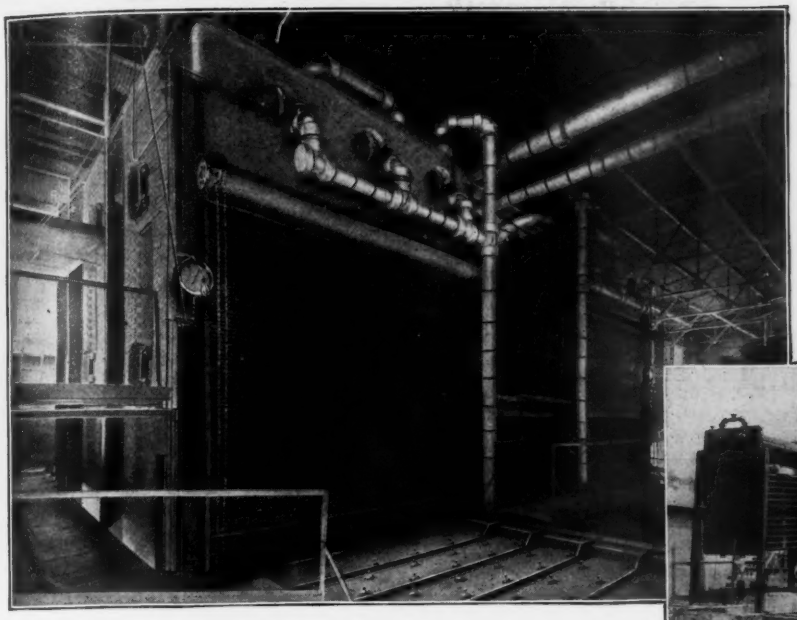


Alpha Portland Cement Co., Alsen, N. Y. Two 749 H. P. Edge Moor Waste Heat Boilers. Martins Creek, Pa., plant of this company also operates three 749 H. P. Edge Moor Waste Heat Boilers and is now installing four additional 1189 H. P.

Trinity Portland Cement Co., Eagle Ford, Tex. Three 1089 H. P. Edge Moor Waste Heat Boilers.

Less Fuel—More Power —Increased Output

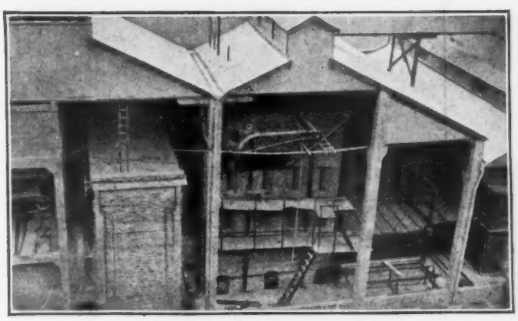
TWENTY-SEVEN cement mills, including several of the largest in the world, are now operating or installing Edge Moor Waste Heat Systems.

Since 1916, when the first distinctly successful cement mill waste heat system was installed by this company in the Alpha plant at Alsen, N. Y., the conservation of waste heat has become recognized as an essential factor in the efficient operation of modern cement mills.

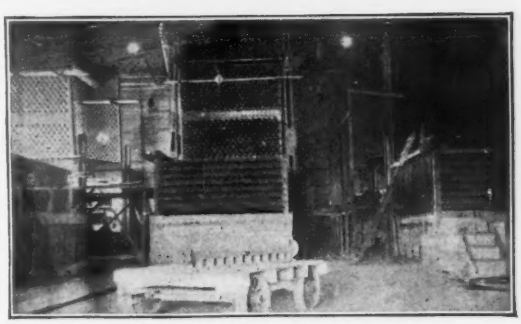
During this comparatively short period, approximately 60,000 H. P. of Edge Moor Waste Heat Boilers have been installed. This represents over 70% of the waste heat boiler horsepower in the cement industry.

Each Edge Moor Waste Heat System is installed with a definite guarantee of results. All engineering, construction and other installation details are supervised by this company.

Let us send you complete information



Hokoku Cement Co., Japan. Two 747 H. P. Edge Moor Waste Heat Boilers.



Hawkeye Portland Cement Co., Des Moines, Ia. Three 805 H. P. Edge Moor Waste Heat Boilers.

EDGE MOOR IRON COMPANY

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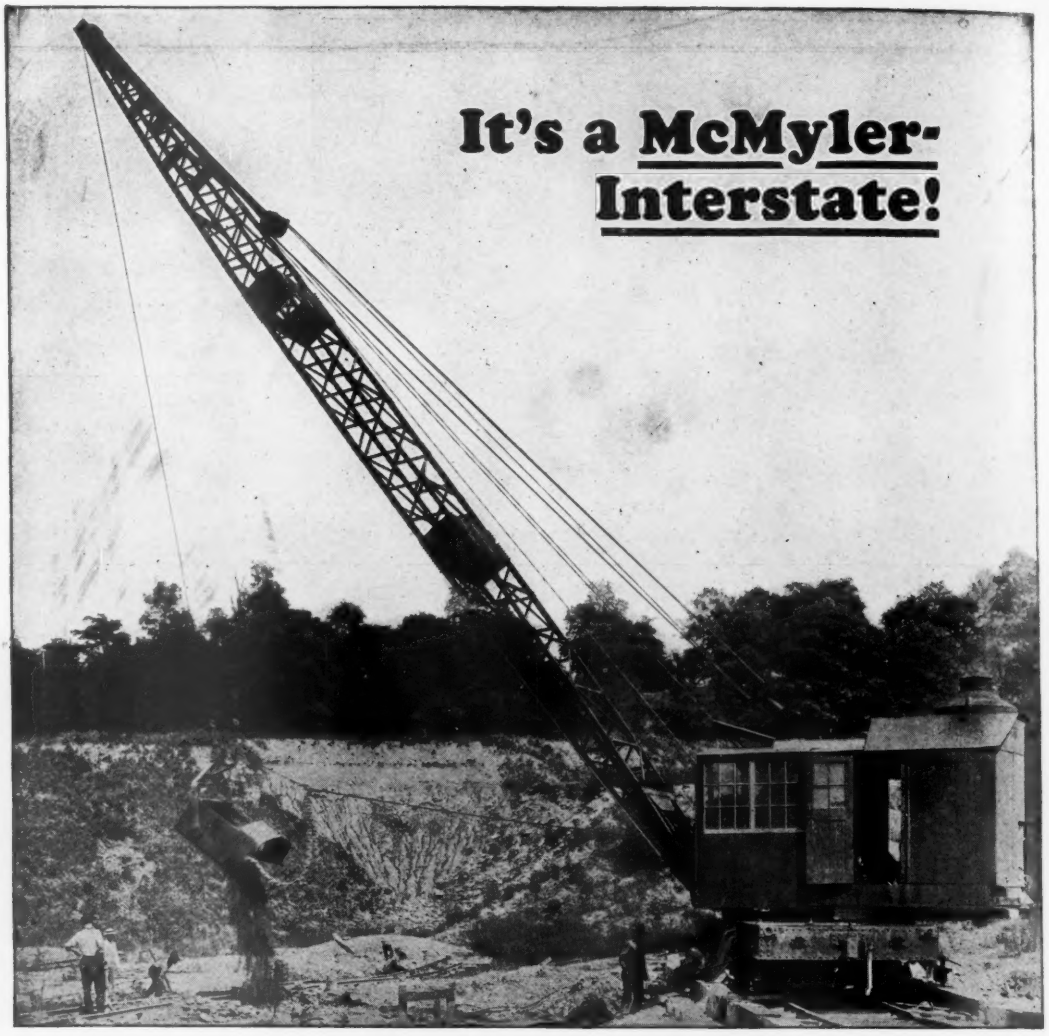
EDGE MOOR Water Tube BOILERS

FOR INCREASED FUEL ECONOMY



A Jack of all Trades and Master of all

This McMyler-Interstate Number Seven is a heavy duty crane built for steady, hard work. The flexibility embodied in its design permits it to accomplish efficiently any of the following standard operations.

1 Operate a drag line bucket as shown above. The line pull available for this purpose is 15,000 lbs. The attachment for drag line work is easily applied.

2 Handle a 40-ton fall block on the main hoist line. The hoisting speed ranges up to 225 ft. per min. giving great expediency in handling miscellaneous loads.

3 Handle a five-ton ball and hook on the auxiliary hoist. For the rapid handling of light loads, this hoist has an available line pull of 10,000 pounds.

4 Operate a two-line clam shell or orange peel bucket. The auxiliary drum acts as an automatic drum and the bucket may be raised and lowered in open or closed position.

5 Operate an electric lifting magnet using a plug-in attachment where current is available or an electric generating set mounted on the car body.

6 Drive piles by means of our Number Ten pile driving attachment. This attachment converts the crane into a standard railroad pile driver.

7 Drive piles by means of pendulum leads. The exceedingly short time in which these leads may be applied makes the crane exceptionally well adapted for general utility work in the field.

8 Switch several railroad cars. The tractive effort is 11,000 pounds, giving plenty of capacity for moving cars about plant and storage yards.

The same size, smaller and larger types are available to reduce your material handling costs. May we send you information?

Locomotive Cranes · Car Dumpers · Coal and Ore Handling Machinery · Forgings
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Suited to the Job

This is the rig that helped to put the Waukesha Washed Sand and Gravel Company to the front in production last year. The plant is up-to-date in every respect, with modern equipment and efficient organization. The Company uses its electric Thew both as a shovel in the pit and as a crane at the stock pile.

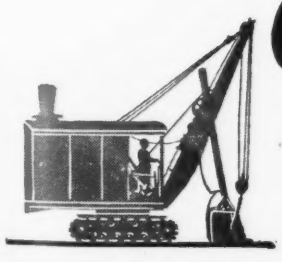
While not phenominal for the Thew, its output figures are interesting.

Working in the pit, the shovel averaged 127 yards of sand an hour. As a crane at the stock piles it handled 165 tons of sand and 120 tons of stone per hour.

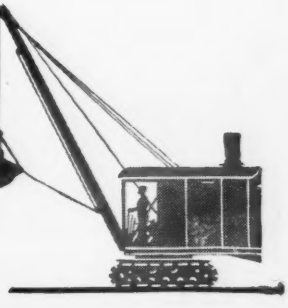
Although constantly in use during the season the upkeep cost nothing and the cost of operation was so low as to effect considerable saving over other equipment heretofore used.

Get acquainted with the electric Thew. It may be just what you need.

THE THEW SHOVEL COMPANY, LORAIN, OHIO



Thew
Power Shovels



KOEHRING
CRANE EXCAVATOR

Again We Say "Boom and Hoist"

COMBINING of these two operations into one simultaneous operation instead of two "stop-and-go" operations means speed in handling materials — a greater ability of the Koehring to work in closer quarters and under a broader range of conditions. "Boom and Hoist" is a distinctive Koehring feature in that the Koehring is *designed* for this combination operation, and inflicts no penalty of excessive wear.

Koehring Heavy Duty construction is a principle of construction which demands extra liberality of strength at every point and oversize construction of every detail. It means lower maintenance, greater trouble-free service life.

Write for Koehring Crane Catalog No. 00

Crane Excavator Capacities

No. 2 Capacity: 12 tons at 12′ radius. ½ yard clamshell bucket loaded with sand or gravel at 45′ radius. ¾ yard clamshell bucket loaded with sand or gravel at 39′ radius. 1 yard clamshell bucket loaded with sand or gravel at 33′ radius. 1½ yard clamshell bucket loaded with sand or gravel at 24′ radius. 1 yard Page drag bucket on a 40′ boom.

No. 3 Capacity: 20 tons at 12′ radius. 1 yard clamshell bucket loaded with sand or gravel at 50′ radius. 1½ yard clamshell bucket loaded with sand or gravel at 39′ radius. 2 yard clamshell bucket loaded with sand or gravel at 33′ radius. 1½ yard Page drag bucket at 40′ radius.

No. 1 Capacity: Equipped with 30′ boom. Handles ¾ yard bucket at 25′ radius; lifting capacity at 12′, 14000 lbs. 4 cylinder 5″x6″ gasoline engine.

KOEHRING COMPANY
Manufacturers of Cranes, Draglines, Shovels, Concrete Mixers
MILWAUKEE, WISCONSIN

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